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CONTENTS

The Hudson & Manhattan (the tunnel railway between New York and Hoboken), after a trial of three months, has taken off the special cars for women which it ran at the rear end of each train in the rush hours, for the very good reason that the women do not prefer them; they seem to be just as well satisfied to ride in the crowded cars. In the announcement the management regrets that the experiment has failed. It was begun for the purpose of showing that the company was alert to meet the wishes of the public, the Interborough having just manifested some unwillingness to comply with a request for women's cars made to it by the New York State Public Service Commission. The Interborough will now laugh, while the other road regrets. Editors and others are trying to solve the psychological mystery in which this action—or non-action—of the women of New York is enveloped, and there is much wise talk about pride, the spirit of independence, and other occult matters; but it looks as though a large part of the mystery could be dispelled by the simple explanation that the women's car was the least desirable one in the train. As a rule, only experienced passengers are wise enough to go to the end of the platform to board a train. Before expending brain power on psychological philosophizings, it might be well to offer the women the best car in the train—one of those near the middle.

Coincident with the strike of white firemen against the negroes on the Georgia Railroad there has been a little disturbance on the Houston & Texas Central which likewise had its origin in the race question. It appears that in the yards of that road at Houston the switching crews are made up of negroes working under white foremen, and the white men have asked that when vacancies occur only whites shall be employed. So grave was the question in the opinion of some of the citizens that a large number of men, including the majority of the state legislature, presented a formal written request to the president of the road asking him to comply with the wishes of the white employees. The president, Mr. Lovett, in his reply declining to accede to the request, makes his strongest point in dealing with the assertion that switching work "should not be placed in the hands of ignorant negroes when sober, industrious, reliable and experienced white men" may be employed. Quoting from a statement covering twelve months ending April 30 last he shows that the cost of repairing cars damaged in the Houston yards was only one-fifth as much per car as it was in the other yards of the company, showing that the work of the negroes was highly efficient, as compared with that of white men. The record of the Houston yards also shows comparatively a small number of accidents to the employees. Moreover, skill is not the only qualification of a switchman; fidelity is important, and the fidelity of the negroes to the interests of their employers is of the most satisfactory kind.

Two fine new passenger stations soon will be under construction in Chicago. The Chicago & North Western's station is already being built, and the directors of the Chicago & Western Indiana have definitely decided to erect a new depot for the accommodation of this road, the Wabash, the Erie, the Santa Fe, the Monon and the Grand Trunk, which now use the Polk Street station, and such other roads as may desire to enter the new terminal. Meantime, there is nothing on the surface to indicate that any steps are being taken for the erection of a new Union passenger station in Chicago. The roads using the present Union station are the Pennsylvania Lines West, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul and the Chicago & Alton. It is ugly, dirty, dark, smelly, too small by far for the business that passes through it, cold in winter, hot in summer—in brief, almost everything that a modern passenger station in a city such as Chicago ought not to be. The roads using it are among the most prosperous in the country. In most respects they are among the best managed and most enterprising and progressive. It is a transportation solecism that the fine trains run by these great roads should arrive at and leave such a structure. The station being such as it is, and the Pennsylvania system, the Burlington, St. Paul and the Alton being such roads as they are, we confidently anticipate that the time will not be long before these roads will do their patrons and themselves the justice of building a station that will take its proper rank among the great passenger terminals of the country.

Dr. Hurty, secretary of the Indiana State Board of Health, is an unusually sensible physician; or, at least, his paper on railway sanitation, which we print in another column, so indicates. We recall few, if any, papers by physicians on this subject which have not been very much open to criticism as

too radical—as demanding a degree of perfection far beyond any reasonable prospect of accomplishment. This paper seems to aim at practical results. The chief fault of the railways—tolerating innumerable unclean stations and cars, while yet by their practice at a few stations and on a few trains showing that cleanliness is practicable—is here plainly characterized in a single sentence. There is no need of lectures on cleanliness; the problem is only to carry out the teachings of lectures already well known. Dr. Hurty does not waste breath denouncing plush car seats, but recognizes the fact that nothing better has been found. We can all rise up and condemn plush as a receptacle of dust when we have abolished dust or have found some better way to corral it. Dr. Hurty recommends earth closets for all passenger cars; and he should be supported by every railway officer in the country. Who knows of any other practical remedy for the offensive conditions which one encounters on railways everywhere? The old and primitive arrangements are defended by no one. With water closets the conditions inside the car can be made more tolerable, but there is still much to be desired. Present arrangements of all kinds are superior to earth closets in just one particular; they can be neglected *ad libitum* without making them absolutely unusable. With earth closets the caretaker *must* do his duty. But this secured, the conditions are undoubtedly the best that can be had with any apparatus now known.

The Interstate Commerce Commission decided on June 21, 21 cases; at least, that is the number that have so far come to hand. These were what is known as formal decisions, the opinion in each case being written by a member of the commission and signed by all of the commissioners. The combined opinions fill 43 printed pages. This is exclusive of the orders which, in each case, filled from one-quarter to one-half a page. On an average 70 days elapsed from the time a case was submitted to the time it was decided. In the 21 cases the complaint was dismissed in seven instances; the defendants opposed the complaint in five instances, but were not successful, and in three instances the attitude of the defendant is not indicated in the opinion. In the six remaining cases, the whole proceedings were apparently a formality, the defendant agreeing that the complaint was proper, and being willing to meet the demands of the complainant, but needing the authority of an order of the commission before doing so. Of course, the commission does not decide 21 cases on every day in the week, but, on the other hand, it does not, like the Supreme Court, hand down all the cases for one week on Monday (the twenty-first was Monday). The number of cases, the fact that in six of them the proceeding was apparently a formality, and the fact that in nearly all of these cases the action was brought to recover reparation for overcharges made some time in the past, and the still further fact that there was hardly any new principles involved in the 21 cases suggests the necessity for some amendment to the Act to Regulate Commerce, or some change in the method of procedure of the commission. Would it not, for instance, be possible to have these actions handled by some man or men less highly paid than the august Interstate Commerce Commission? In fact, why not frankly acknowledge that the commission, largely composed of lawyers, has assumed the functions of a judicial body, and why not create additional lower courts, making the present commission a court of appeals only?

One of the committee reports presented at the first annual meeting of the International Railway Fuel Association, held in Chicago week before last, deals with the subject of correct weighing of coal at mines and on railway track scales. Among the points discussed is the legitimate shrinkage allowable on car lots, and reference is made to the false impressions that prevail regarding the effect of weather on the weights of loaded coal cars. The report points out that a full inch of rain falling on and retained by the coal loaded in a 36-ft. car would increase the weight 1,600 lbs. But drainage occurs almost as fast as the rain falls, and as evaporation is rapid, the effect is only temporary. In the discussion of this report there was submitted by the secretary an interesting statement of a test made by the St. Louis & San Francisco of coal from the Pittsburg, Kan., field, to determine the shrinkage or gain due to weather conditions. The test was made in the latter part of May and extended over 13 days. There were 25 cars; ten were box or stock, and the remainder were open cars. The average moisture content of coal from this district is 2.85 per cent. During the first seven days there were light rains on three different days; but with one exception the loads showed a shrinkage in weight averaging 0.24 per cent. for the closed cars and 0.64 per cent. for the open cars. Following the seventh weighing a heavy rain set in, which continued through the following day and until 4 a.m. of the second day, the weather clearing at noon and continuing clear throughout the rest of the test. Weights on these days were taken at 1.30 p.m. Although weighings of the closed cars were discontinued after the tenth day, the weight showed an average shrinkage of 0.05 per cent. The open cars showed a net gain in weight of 22,360 lbs. in the first weighing after the heavy rains, which shrunk to 4,150 by the end of the test, an average of 188 lbs., or 0.14 per cent. per car. And while the extreme gain and shrinkage for individual open cars were 1,080 and 450 lbs., respectively, the average result well bears out the committee's statement that the weather effect, on the whole, is relatively unimportant.

CAR LIGHTING.

In Mr. Fowler's investigation of the present status of the car lighting problem, published this week, some rather noteworthy facts are brought out. It was frankly acknowledged several years ago when electric lighting of passenger cars was first undertaken, that it was expensive; so expensive, in fact, that railway officers did not like to think about it, much less give out cost figures for the benefit of the public and for the scrutiny of directors and stockholders. Electric lighting was used for advertising purposes, and even this value was questioned in some quarters. But "electrically lighted trains" sounded well, and so the practice grew, until the added expense has become a matter of course along with certain wastes of fuel and supplies that nobody seems able to prevent. It has been generally supposed, however, that the cost of electric lighting has been greatly reduced, and that, for the amount of light supplied, it did not cost much more then compressed gas.

It is something of a shock, therefore, to find from the plain statements of railway companies using electric light, with which they are apparently perfectly satisfied, that the cost is from six to eight times that of the most efficient form of gas lighting, and from three to four times that of the old-type of apparatus, with which it was at first compared.

In Mr. Fowler's study no cost data were asked or obtained from the manufacturers. Of four systems of electric car lighting, reports obtained direct from the railways showed that the dynamo in the baggage car is the most expensive; in fact, that it is apparently the most costly system of car lighting in existence. This is true not because of the original cost, or of maintenance cost, or even in the actual fuel cost of generating the light, but because of the cost of attendance. In itself, the mechanism is exceedingly simple, and were it not for the attendance charge, the baggage car dynamo would rank well. But nearly $1.50 per evening for each car, without any added comfort to the passenger, is a rather high price.

The axle light runs it a close second, and even the figures that are given for this are not altogether satisfactory. Up to the present time, all estimates of the amount of power re-

quired to drive the axle generator have been based upon shop tests. Anyone who has had experience with the difference in behavior of apparatus under shop tests and service tests knows that there is usually a wide difference. The location of the dynamo beneath the car, suspended from the truck, is most trying to its efficiency, and the added effects of dirt, moisture and wind create a strong presumption that the mechanical efficiency is greatly decreased. If this power consumption is to be reduced the proper thing to do would be to make an actual dynamometer test of the power required in service, and not an electrical test as is usually done.

The third system of electric lighting (also the oldest, so far as its application to railway cars is concerned), is the simplest; the storage battery. But even this appears to be about seven and a half times as expensive as the best form of compressed gas lighting, and that on a comparison made with figures taken from the records of a single road using both systems.

THE MEXICAN CENTRAL UNDER PROGRESSIVE MANAGEMENT.

The merging of the Mexican Central Railway with the other lines now under control of the Mexican government marks the passing of the larger railway systems which have done so much to further the commercial advancement of Mexico from the control of United States interests which built them and to whom much credit for the development of business in that republic is due. The new line of the Southern Pacific and the Kansas City, Mexico & Orient, both in process of construction, are the only exceptions.

The Mexican Central, reaching from El Paso to the City of Mexico, with branches extending to either coast and to practically every important city in the republic, has, since the date of its completion, been susceptible of wonderful development, with careful and intelligent management. Results have shown it was unfortunate in not having this at all times, so that when the business depression, beginning in the United States in 1907, spread into Mexico, the property had reached a point where its earning power and physical condition were at the lowest ebb, and its board of directors saw they must instil into the property and its officers and employees modern railway methods as practised on our best United States roads.

It was a known fact that the traffic to increase the earnings of the road was available, but that which was offered had not been economically handled, so that at the beginning of 1908, when business and earnings had fallen off nearly 30 per cent., with no revival in sight, the property had apparently nothing but a receivership before it. A change in management was therefore made, S. M. Felton being elected president.

The following figures show the results obtained by the adoption of improved operating methods and the possibilities of the road. The figures cover a period of six months prior to the taking over of the property by the government, as compared with the same period before the introduction of modern methods. In the 1907 period the business depression had not affected earnings, while Mexico was in the midst of the depression at the end of 1908:

	Six months ending				
	1907.	1908.	Change.		Per cent.
Av. miles operated	3,224.8	3,245.7	Inc.,	20.9	.....
Gross earnings	$9,208,226	$7,657,221	Dec.,	$1,551,005	16.84
Operating expenses	6,824,270	4,832,625	"	1,991,645	29.18
Net earnings	2,383,956	2,824,596	Inc.,	440,640	18.4
Per cent. of operation	74.11	63.11	Dec.,	11.00	.....
Gross revenue per mile	2,855	2,359	"	496	17.73
Net revenue per mile	739	870	Inc.,	131	17.72
Earnings per train mile:					
Pasenger	3.22	2.67	Dec.,	.55	17.08
Freight	4.41	5.78	"	1.37	31.06
Amount, operating rolls.	7,520,968	5,483,885	"	2,037,083	27.0
Amt. paid for overtime.	370,534	117,335	"	253,199	68.3
Tons per loaded car	21	24	Inc.,	3	14.2
Tons per train-mile	261	351	"	90	30.5
Locomotive mileage	6,411,045	4,575,709	Dec.,	1,835,336	28.0
Pass'ger train-mileage	1,629,135	1,462,674	"	166,461	10.0
Freight train-mileage	2,910,974	1,894,125	"	1,016,849	34.0
Engine failures	1,837	439	"	1,398	76.0
Train accidents	279	144	"	135	48.0
Personal injuries	311	153	"	158	50.0

A study of the statistics show a rather extraordinary state of affairs. With a decrease of 16.8 per cent. in gross earnings, due entirely to the business depression which was at its height during the latter part of 1908, the decrease in operating expenses was greater by 12.3 per cent. and net, in face of the decreased gross earnings, showed an increase of 18.4 per cent.

Notwithstanding the decrease in operating expenses, there were put in track 11,655 tons of new 75-lb. rails and 593,112 ties, and about 150 miles of track was ballasted with stone and gravel. The percentage of engines in bad order was reduced from 27 per cent. to 17 per cent.

At the end of 1907 177 of the locomotives were burning oil obtained from wells on the Tampico branch of the road; the rest were coal burners. At the close of 1908 247 engines had been equipped to burn oil, and the saving for the six months from burning oil over coal amounted to $452,478.

During the dry season the line north and south of Torreon is very dusty. This track was sprinkled with three coats of crude oil for a distance of 150 miles, abolishing the dust nuisance entirely.

Of the main line extending from El Paso to Mexico City, a distance of 1,222 miles, over two-thirds was formerly laid with 56-lb. rails on old pine ties on a dirt roadbed. This necessitated the passenger trains being scheduled at a speed of 25 miles an hour for the entire distance. With the rehabilitation of the line nearly five hours was cut from the running time.

At Tampico, the Gulf port, there was an accumulation of over 1,200 loaded cars completely blocking the terminal, some cars having remained there for over a year. At the end of 60 days this was entirely removed.

At the time of turning the road over to the government its physical condition had been improved fully 50 per cent. In fact, it was the best in the history of the road. Trains were all operated on time, and the organization was thorough and efficient.

The entire record is remarkable and a high tribute to modern, progressive methods of railway management.

THE BATTLEFIELD OF THE RAILWAY.

There is, we presume, no doubt that within a very few years the electrical extension of the New York, New Haven & Hartford from Stamford to New Haven, some forty miles, will be in operation and electric locomotives drawing both freight and passenger cars over the 70 miles or more between New Haven and the Grand Central Station. The plans have been drawn, the estimates made both for cost of construction—estimated at some $20,000,000—and, what is more important, estimates of the cost of operation showing economies of the extended line as compared with steam, saying nothing of convenience and comfort of the passenger. Nothing but the fiscal impediment expressed in terms of net earnings and the revival of business stands in the way; and it is hardly a secret that President Mellen is looking forward to still further electrical extension of his system beyond New Haven, and believes that the results, when added to the electrical sequels on his new terminal and suburban lines at and near New York, will be epoch-making in the history of the American railway. Even if we accept this vision as the merely personal outlook of one man, the application of electricity to such a main line as the New Haven with its traffic densities is a matter of absorbing interest.

But it is more than merely interesting. It is a kind of text that links itself to discourse on that great battlefield with its advances, its retreats, its flank movements and field tactics in which the railways of the land have, for the last two decades, been contending with rival forces.

If one may drop for a moment into academic disquisition, action and reaction is the great law, inexorable as gravity, in the story of the advance of our race. It runs through morals, civics, the whole material world. The good ruler succeeds the bad ruler, and him a good ruler again. A nation in its

ethics, its religion, its material condition, recedes, goes ahead, then reacts. There are degrees, as in the case of the Anglo-Saxon on the one hand, or the Turk on the other, but the bedrock law is there, though it swings through varying degrees of the human arc. It is even so in, perhaps, somewhat less degree, in the mechanical world. There positive progress is more definite and constant, but, as a kind of makeweight, the competitions are more immediate and intense, with the battle ever going on like that of the big gun with the steel-clad warship. One great invention succeeds another, and not seldom crowds it out.

In applying this basic law to our railways it is very striking to see how forcefully it has struck in during the last two decades, which span mainly the period when electricity has entered into rivalry with steam. During that time the new force, constantly expanding in its adaptations, has hit the railway hard at two points—the rival electric railway and the long-distance telephone. To these must be added, during the last two or three years, the automobile. In none of the three cases, still less in the total of the three, can the rivalry be accurately measured. The electrical railway, as a parallel, is a rival at proximate stations, a feeder to remoter ones and a feeder almost exclusively when a lateral and not a parallel of the steam line. The long-distance telephone in possibly 5 per cent. of the instances where it prevents the railway journey, compels it; and even the automobile carries the passenger to the railway station as well as takes him by. But, in their aggregate, the three forces, impacting on railway travel, must have been very serious if indefinite. Nor, letting alone matters of legislation, are such new physical rivalries the only problems that the railways have been compelled to front and solve within the two decades or less. Such problems as the higher organization of labor by the unions and the terminals in big cities are in the very foreground of the battlefield.

But for the railway, in the long conflict, there is a positive as well as negative side, gains as well as losses, and, in the language of warfare, reinforcements to offset those losses. With the New Haven plan as an example, how long will it be before the railway will find its substitute for steam and have made its rival a servant? The automobile may multiply. But it can never be an extensive freight carrier, must, in the main, for long distance service, be the adjunct of wealth, and its unit cost of transportation high in comparison with the railway. Its rivalry is incidental and limited. Effects of the long-distance telephone on railway travel have been unquestioned if nebulous. But, whatever it has been, it is largely in the past tense, and its future increments and rivalries not, relatively at least, great. Finally, in the costly problem of the railway terminal in the big city there are two solutions ahead, one in the ground, the other in the air, and both co-working toward economic results of the most momentous character. The subway, with its utilization of the vast underground spaces, prefigures the modification of the great city terminal, making it distributive rather than centralized. And the New York Central-New Haven plan of spanning their great open terminal spaces with commercial structures—a point where we are to follow English railways with belated step—is another development of the future far more material already than a suggestion.

In the battlefield of the railway, where it contends against new conditions and circumstances, there are other reinforcing elements. The economics of operation, the increased trainload, the improved plants which spell cheapness in the end, the myriad of mechanical points upon which inventive railway minds are centering are not lightly to be passed by. The Goddess of Invention is not an unbalanced deity. If she assails the railway on the one side she protects and aids it on the other. In the ultimate outcome the railway, judging by the past, has not much to fear. An interest represented by its billions of dollars which has passed so well through the many-sided attacks of the last few years of almost dramatic mutation can hardly view with dread that battlefield of the future on which its foes, physical and otherwise, cannot possibly be stronger and are likely to be less.

Contributed Papers.

RAILWAY TELEGRAPH SUPERINTENDENTS' ASSOCIATION.

The twenty-eighth annual meeting of the Association of Railway Telegraph Superintendents was held at Hotel Pontchartrain, Detroit, June 23, 24 and 25, about seventy-five active members being present, and President W. J. Camp, of Montreal, in the chair. President Camp made a brief report of the progress of the association during the past year, making mention of the death of Charles P. Adams, Henry C. Hope, P. W. Snider and E. H. Millington, superintendent of telegraph of the Michigan Central. Mr. Millington died the day before the meeting of the convention. He was the efficient chairman of the committee of arrangements previous to his illness. A. B. Taylor (New York Central), C. S. Rhoads (Big Four), William Kline (L. S. & M. S.), L. A. Lee (P. & E.), W. L. Connelly (Chicago & Indiana Southern) and G. C. Todd (Nickel Plate) were appointed to attend Mr. Millington's funeral, which occurred at St. Thomas, Ont., June 24.

The report of Treasurer Drew showed that the association was in good financial condition. W. K. Morley, of Grand Rapids, Mich., the first president and the organizer of the association, addressed the convention, telling of the steps which led up to the formation of the association twenty-seven years ago, it being the outgrowth of monthly meetings which were held in Chicago in the office of Fred. H. Tubbs, superintendent of the Western Union Telegraph Company.

Several changes were made in the constitution, among the most important of which were the provisions for holding regular meetings of the Western Division in September and January and of the Eastern Division in November and March, the addition of a second vice-president to the list of officers and the raising of the annual dues of the association to $7.50.

The report of the committee on "High Tention Wire Crossings" (G. A. Cellar, chairman), was presented by Mr. Cellar. As a dividing line for their purposes between high tension and low tension work the committee adopted 700 volts. As part of their report they drew up specifications for overhead and underground crossings of wires, also for cables, carrying 700 volts or over, and also prepared specifications for crossings for overhead wires or cables carrying less than 700 volts. In connection with their report they prepared a form of agreement to be entered into by the railway company and the company desiring to cross the right of way with their wires.

At the evening session, which lasted from 8 until 10 o'clock, an interesting paper on "Efficiency of Office Organization" was read by J. B. Sheldon (Union Pacific). Mr. Sheldon outlined the plan of organization adopted in his department, and his paper received much favorable comment.

A paper on "Preservation of Poles" was read by H. P. Folsom. In the discussion J. McMillan (Canadian Pacific), Calgary, Alb., said that in part of his territory, poles instead of beginning to decay at the ground line began 4 or 5 ft. below it.

The second day's proceedings began with the reading by V. T. Kissinger (C., B & Q.) of his paper on "Wire Testing and Care of Wires." W. P. McFarlane (C. & N. W.) led in the discussion of this paper. F. T. Wilbur (Illinois Central) explained a short circuit push-button arrangement which has been used on his road with good results.

A paper by H. D. Teed (S. L. & S. F.) on the "Difference Between the Trouble Shooter and the Division Lineman" was read by E. A. Chenery and discussed at length. It was the consensus of opinion that the telegraph linemen could soon

be educated to care for the telephone system as effectively as for the telegraph system.

J. C. Kelsey, of Chicago, presented an interesting paper on "Telephone Construction." An exhaustive paper on "Dry Batteries" was read by F. H. Loveridge, of Chicago. U. J. Fry (C., M. & St. P.), who had an extensive experience on this subject, led in the discussion of Mr. Loveridge's paper, telling of the use of dry batteries for telephone despatching work and the economy which had been effected by using them on 400 miles of his road. W. J. Camp gave interesting facts concerning his experience with the use of dry cells for telephone despatching, and G. H. Groce gave experiments with the use of dry cells for operating a block signal wire.

Los Angeles was selected as the place for holding the next annual convention, which it was decided to hold about the middle of May, the exact date to be decided by the executive committee.

The election of officers resulted as follows: John L. Davis, of Chicago (C. & E. I.), president; I. T. Dyer (San Pedro, Los Angeles & Salt Lake), first vice-president; George A. Cellar (Pennsylvania Lines West of Pittsburgh), second vice-president, and P. W. Drew, of Chicago (Chicago division of the Minneapollis, St. Paul & Sault Ste. Marie), secretary and treasurer.

After the election of officers the members adjourned to the Casino at Belle Isle, where they enjoyed a dinner in the open air. On Friday there was an excursion to Port Huron over the Grand Trunk Railway, returning by steamer down the St. Clair river.

EXHIBITS.

J. H. Bunnell & Company, Inc., New York.—J. J. Ghegan.

Dean Electric Company, Elyria, Ohio.—Indestructible telephone apparatus; receivers and mouthpieces made of drawn metal covered with black composition. Exhibit in charge of A. D. T. Libby and A. B. Smith.

G. M. Dodge, Valparaiso, Ind.—Automatic self-teacher of telegraphy.

Duplex Metals Company, New York.—Copper-clad steel wire. Represented by J. B. Given, vice-president; J. T. Kinder, secretary, and J. E. Ham.

The Egry Register Company, Dayton, O.—M. C. Stern, treasurer and general manager.

General Railway Signal Company, Rochester, N. Y.—Selective train despatching apparatus, the invention of G. H. Groce, superintendent of telegraph of the Illinois Central. Represented by W. W. Salmon, president; Geo. D. Morgan, vice-president and treasurer, and M. F. Geer, sales engineer of the company, Rochester, and W. G. Hovey, special agent at New York.

Kellogg Switchboard & Supply Company, Chicago.—Telephone equipment of various styles. Represented by J. C. Kelsey, G. A. Joy and Edward Parliment.

Kerite Insulated Wire & Cable Company, New York.—Percy W. Miller.

Okonite Company, New York.—John Langan.

Railroad Supply Company, Chicago.—E. W. Vogel, signal engineer.

Railway Telephone & Electric Company, Lafayette, Ind.—Railway telephone apparatus. Exhibit in charge of O. T. Lademan, general manager.

Rock Island Battery Company, Cincinnati.—Dry Batteries. Represented by M. S. Rosenthal, president of the company, and Philip Cass and F. C. Ketzel.

John A. Roebling's Sons Company, Trenton, N. J.—R. R. Newell, of the Trenton office; G. W. Swan, of New York, and W. H. Slingluff, of Chicago.

Sandwich Electric Company, Sandwich, Ill.—Represented by H. O. Rugh, C. S. Rhoads, Jr., and E. Parsons. Selectors and adjustable telephones; a cordless jack back, with which one telephone can be used on a number of circuits without the possibility of cord trouble.

Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.—Selective despatching equipment, showing a master station and three line stations; complete line of standard telephone apparatus, consisting of iron-clad railway telephones, jack boxes, portable and semi-portable telephone sets and magneto wall telephones. Exhibit in charge of E. O. Munson and Messrs Hague, Gibson and Button of the Rochester office; J. O. Oliver, of Philadelphia, and E. C. Lewis, of Chicago.

United States Electric Company, West Newton, Mass.—Multiple and single station selective calling systems, with master selector and several station equipments in operation on each system; single station central battery selector, by means of which any station on a line may be called in from two to eight seconds. Represented by H. E. Merrell, general manager; E. R. Gill, electrical engineer, and M. E. Launbranch.

Watson Insulated Wire Company, Chicago.—J. V. Watson and B. L. Winchell, Jr.

Western Electric Company, Chicago, Ill.—Telephone apparatus for railway service; Gill and Cummings-Wray selectors; several types of portable or train telephones. Represented by W. E. Harkness, sales engineer; H. L. Burns and R. F. Spamer, of New York, and Mrs. C. L. Howk and J. H. Finley, of Chicago.

Charles E. Davies, chief operator of the Great North Western Telegraph Company, at Ottawa, Ont., in response to requests from several members, exhibited a full set of his telegraph repeaters, which are giving satisfactory service. Mr. Davies' invention made a favorable impression and several members contemplate giving it a trial. Its predominating features are simplicity and ease of adjustment.

LOCAL FREIGHT AGENTS' ASSOCIATION.

The twenty-second annual convention of American Association of Local Freight Agents' Associations was held at Albany, N. Y., June 22-25, with 230 agents in attendance, representing associations in 70 of the 96 cities which are members of the organization. The extremes of the country were represented —Winnipeg, San Francisco, Houston, New Orleans, Mobile, Jacksonville, Baltimore, Boston, Portland, Me., and Montreal.

The report of the secretary showed that the New York City association withdrew prior to 1908 meeting, but as 1908 dues were paid it was shown in the list of members. During the current year Milwaukee and Shreveport disbanded, making a loss of three associations. New applications were accepted from Washington, D. C., Tampa, Fla., Spokane, Wash., Houston, Texas, Gary, Ind., Athens, Ga., and Bloomington, Ills., making a net gain of four associations, or a total of 96, with a membership of 1,043.

The opening session was held in the assembly chamber of New York's magnificent state capitol, where delegates and their ladies were welcomed by Governor Hughes, Mayor Snyder, Clifford S. Sims, Vice-President of the Delaware & Hudson, and F. A. Harrington, Superintendent of the New York Central. An address was given by W. J. Mullin, General Traffic Manager of the Delaware & Hudson.

The business of this association is to discuss questions concerning the work of local freight stations and offices, and to formulate conclusions in such shape that the "Conference Committee" can lay them before the higher officers or take them to other associations, whichever course may seem desirable. This method of procedure has been the result of the experience of the association. The local freight agent deals with many of the most important questions that come up in railway management, yet, owing to the limited sphere of his authority, looked at from a territorial standpoint, he can accomplish little in the way of change or improvement, except by going to some higher officer—one who has authority over the whole of the company's lines. At the Albany meeting 31 subjects were presented and each was labeled with the name of the city whence it was presented.

Topic No. 1.—The meeting endorsed the proposal from Council Bluffs that there should be much more through billing in order to avoid delays at junctions.

No. 2.—The association recommended that seal presses be done away with and some seal adopted which does not need a press. Presses frequently get lost.

No. 3.—When a shipper loads a car, he should put on the doors his private seals; this to prevent disputes as to losses.

4.—Thefts of freight at large terminals are very common, and, after a discussion of the subject, the Conference Committee was directed to see what could be done toward taking joint action with city authorities to break up "fences."

5.—Compensation of railway clerks. The pay of clerks should be increased only on the basis of merits, as shown by a thorough system.

6, 7, 8.—These topics, presented by three different cities, brought up the question of disputes as to weight of carload shipments and the settlement of claims. It was the sense of the meeting that universal through billing was the most comprehensive remedy applicable; and that actual weights should be shown on all billing from point of origin.

9.—Filing of tariffs.—All tariffs should be printed on loose-leaves; and, of course, each road should have uniform filing methods at all stations.

10, 21, 29.—These topics dealt with the general question of efficiency of the organization and the meeting listened to an address by W. H. Drayton, representing the American Rail-

way Association, who recommended that the freight agents reorganize so as to be subordinate to the A. R. A. The meeting heartily adopted his suggestions, and a special committee was appointed to deal with the matter, consisting of: C. E. Cochrane (Penna.), Baltimore, Md.; W. W. Alexander (L. & N.), Cincinnati, O.; T. P. Adams (Mo. Pac.), St. Louis, Mo.; W. P. Martin (Can. Pac.), Montreal, P. Q.; D. G. Hood (P. & L. E.), Pittsburgh, Pa.

11.—Necessity of having shippers make out bills of lading and shipping orders with ink or indelible pencil.—The secretary was instructed to print a circular on this subject, which has been issued by the Chicago Chamber of Commerce.

12 and 13.—Universal prepayment.—The Conference Committee was instructed to agitate this matter and to advise shippers that many large firms are now prepaying all their shipments.

14.—Omaha proposed a standard code of freight traffic rules, and the proposal was endorsed and referred to the Conference Committee.

17.—Inspection of shipments billed to order.—Where shipper allows consignee to inspect, he should say definitely what, if any, samples may be taken out of packages.

20.—The convention approved a proposal from Detroit to have blanks of special form or color for way bills and expense bills of freight billed to the shipper's order.

22.—A member from Kansas City explained the way-bill clearing house established there. The same scheme is being tried at other cities.

26.—Checking carload shipments delivered from team tracks.—Atlanta proposed that the carrier should not help load or unload, or, if any help is given, a charge should be made. It is desirable that consignee sign for the contents when the seals are broken; thereafter he should use his own lock or seal. The meeting approved this view.

27.—Time for holding annual meeting.—A special committee reported that the time between April 15 and June 15 should be avoided on account of floods and labor agitation.

30.—A special committee described a method in use at Peoria, Minneapolis, Omaha, Kansas City and other places for reclaiming grain doors; and recommended a door used by the Chicago, Burlington & Quincy. The convention endorsed the reclaiming idea, but could not agree on a standard door.

The election of officers for the ensuing year resulted as follows, a star indicating re-election: President, C. A. Witzel, B. & O., Cleveland; vice-president, H. J. Griffing, M. & O., Mobile; treasurer, C. E. Fish, B. & O. S. W., Cincinnati, secretary, G. W. Dennison, P. Co. & H. V. Ry., Toledo.

Mobile was selected as the place for the next meeting, time to be fixed later by the executive committee.

On Friday the members went to Lake George, stopping at Saratoga. On this excursion the members had with them Vice-President C. S. Sims, of the Delaware & Hudson; General Manager Crowley, of the New York Central; W. J. Mullin, general traffic manager of the Delaware & Hudson, and other railway officers.

THE "CHIEF" FREIGHT CAR SEAL.

This seal, shown in the accompanying engraving, Fig. 1, has been used on the New York Central for the past two months, and is reported as giving marked satisfaction. It is designed on the familiar principle of a lock, which is easily opened while uncovered; but which, for the purpose of preventing unauthorized opening of the door, is covered with a metal shield. This shield, which has to be destroyed to open the door, is made of what is known as "tiger iron," and it can be readily lithographed, embossed or perforated. This metal shield has sufficient substance and toughness to make it somewhat difficult to destroy, and this is the distinctive merit of the invention. To get it out of position, so as to permit the

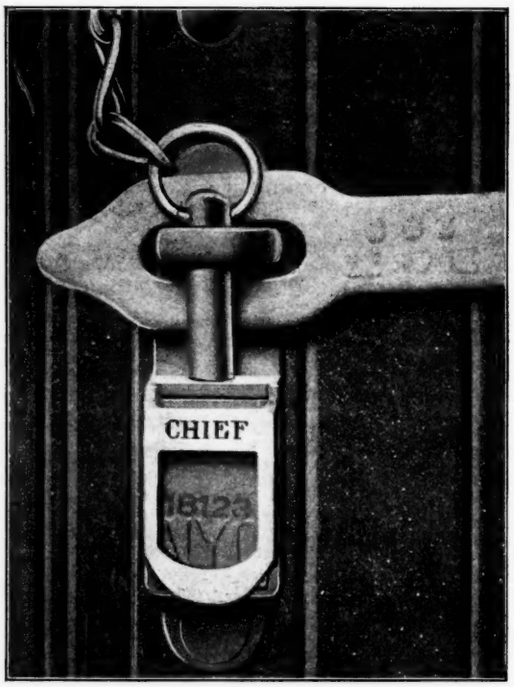


Fig. 1—The "Chief" Car Seal.

Fig. 2.

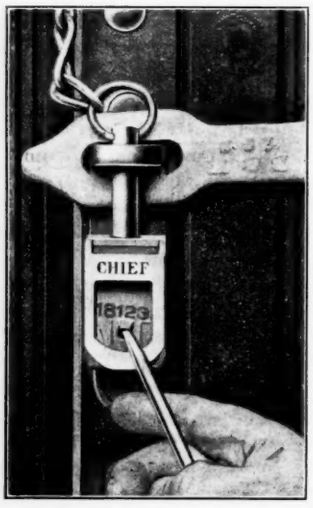


Fig. 3.

Fig. 4.

Fig. 5.

opening of the lock, requires considerable time and force, and it is believed tampering will always expose itself. The agent at one of the stations on the line where the new seal has been most used says that the time required to open the car doors on the platform side is from 30 to 60 seconds, and where the man has to stand on the ground, about 90 seconds. Cars can be sealed, however, in less time than with wire seals. The method of using the seal is clearly explained by the smaller pictures, Figs. 2, 3, 4 and 5; Fig. 2, inserting the seal; Fig. 3, breaking the seal; Fig. 4, removing the seal; Fig. 5, opening the lock.

It will be observed that the serial number on the seal is large enough to be easily read in ordinary light and also large enough so that the absence of a seal will be readily noticed. This seal is made by the Albany Lock & Seal Company, Albany, N. Y.

FIFTY-TON CLASS G. J. GONDOLA CARS FOR THE NORFOLK & WESTERN.

The Norfolk & Western is now building at its Roanoke shops a number of 50-ton, class G.J., all-steel gondola cars. In all, there will be 300 cars, and at the outset one sample car was built in order to make any alterations which might seem advisable in working out the design in actual construction.

The original design provided for eight drop doors. Two pairs of these were placed on one side, each pair being hinged at a point 12 ft. 3⅜ in. from opposite ends of the car. This left an opening in the center sufficiently large to place another pair of doors and the design was changed accordingly, and it necessitated a slight readjustment of the brake cylinder position. On the other side of the sample car, two of the four doors are hinged on the cross center-line, the other two being single doors and hinged about 7 ft. 5 in. from this center line. This arrangement left sufficient space to include two additional doors, hinged on the same line as the single ones, and the design was changed to provide for four doors instead of two on this side also. The addition of the four doors, two on each side, provides for discharge openings extending for about 22 ft. of the length of the car and centered between the trucks.

Another slight change in design was made in the material used for the stakes, which, in the sample car, are made of Carnegie tie sections, while in the 299 cars yet to be built, the stakes will be 3½-in. deck beams. This alteration in material was due especially to the fact that the rivets may be more easily machine-driven with the beam sections. There have also been a number of minor changes in the rivet spacing to accommodate the use of multiple punches, also in the location of hand holes, brake staffs and stake pockets.

These cars measure 40 ft. over end sills with inside dimensions of 38 ft. 7½ in. long, 9 ft. 3 in. wide and 4 ft. 4 in. high. The bottoms, sides and ends are made of ¼-in. plates. The center sills are composed of 15-in., 33-lb. channels, with a ⅝-in. coverplate on the top, the bottom portion between the bolsters being reinforced with 3½-in. x 3½-in. x ½-in. angles. Where the cover plate is cut away in order to provide for the top bolster plate, it is reinforced by 3½-in. x 3½-in. x ⅜-in. angles, designed to transfer the stresses from the front to the back portion.

The body bolsters have been made very strong, as the major portion of the load will be transmitted to the bolsters through the deep plate girders which form the sides of the car. These plate girders are designed especially for stiffness, as it is probable that they will carry the maximum portion of the load.

These cars will be equipped with Sessions draft gears, Farlow draft attachments, Westinghouse air brakes, cast steel truck bolsters, Andrews cast steel side frames, plastic bronze journal bearings, and Kensington journal boxes will be used on a part of the cars.

These designs were made at the shops of the Norfolk & Western, Roanoke, Va., under the supervision of W. H. Lewis, Superintendent Motive Power, and John A. Pilcher, Mechanical Engineer.

A. R. A. COMMITTEE.

In the Proceedings of the American Railway Association, just issued, are the names of the members of the committees as organized under the new constitution. Omitting the dates showing expiration of terms, the list is as follows:

OFFICERS OF THE ASSOCIATION.

F. A. Delano, President, Chicago, Ill.
Daniel Willard, First Vice-President, Chicago, Ill.
W. G. Besler, Second Vice-President, New York City.
W. F. Allen, General Secretary and Treasurer.
J. E. Fairbanks, Assistant General Secretary and Assistant Treasurer, 24 Park Place, New York City.

MEMBERS OF COMMITTEES.

Executive Committee.

F. A. Delano, President, Wabash.
Daniel Willard, Second Vice-President, C., B. & Q.
W. G. Besler, Vice-Pres. and Gen. Mgr., C. R. R. of N. J.
C. R. Gray, Vice-President, St. Louis & San Francisco.
I. G. Rawn, Vice-President, Illinois Central.
J. Kruttschnitt, Dir. of Main. and Op., U. & So. Pac. Systems.
H. U. Mudge, Second Vice President, C., R. I. & Pac.
G. L. Peck, Gen. Mgr., Penn. Lines West of Pittsburgh.
T. E. Clarke, Gen. Supt., Delaware, Lackawanna & Western.
*L. F. Loree, President, Delaware & Hudson.
*A. W. Sullivan, Gen. Mgr., Missouri Pacific.
*Stuyvesant Fish, Dir., Yazoo & Mississippi Valley.
*W. C. Brown, President, New York Central Lines.

Committee on Nominations.

J. C. Stuart, Temporary Chairman.
J. C. Stuart, General Manager, Erie.
A. H. Smith, Vice-Pres. and Gen. Mgr., N. Y. C. & H. R. R.
Benj. McKeen, Gen. Mgr., Vandalia.
F. O. Melcher, Gen. Mgr., Chicago, Rock Island & Pacific.
Chas. A. Wickersham, Pres. and Gen. Mgr., Western of Ala.

Commission on the Interchange of Freight Cars.

James McCrea, Chairman.
James McCrea, President, Pennsylvania.
Lucius Tuttle, President, Boston & Maine.
W. W. Finley, President, Southern.
Howard Elliott, President, Northern Pacific.
J. Kruttschnitt, Dir. of Main. and Op., U. & S. P. Systems.

Special Committee on Relations With Interstate Commerce Commission.

F. A. Delano, Chairman.
F. A. Delano, President, Wabash.
W. C. Brown, President, New York Central Lines.
Samuel Rea, Second Vice-President, Pennsylvania.
Daniel Willard, Second Vice-President, C., B. & Q.
Robert Mather, Vice-President, St. Louis & San Francisco.

Committee on Transportation.

F. C. Rice, Temporary Chairman.
F. B. Harriman, General Manager, Illinois Central.
W. H. Brimson, Gen. Supt., Baltimore & Ohio Southwestern.
(One vacancy.)
R. H. Aishton, Gen. Mgr., Lines E. of Missouri R., C. N. W.
F. C. Rice, Gen. Inspector of Tranportation, C., B. & Q.
W. G. Van Vleck, Second Vice-Pres. and Mgr., G., H. & S. A.
M. S. Connors, General Supt., Hocking Valley.
A. M. Schoyer, Gen. Supt., N. W. Sys., Penn. Lines W. of Pittsburgh.
C. E. Lee, General Supt., Boston & Maine.

*Ex-president of the Association.

Committee on Maintenance.

J. J. Turner, Temporary Chairman.

A. T. Dice, General Supt., Philadelphia & Reading.
E. C. Carter, Chief Engineer, Chicago & North Western.
J. B. Berry, Chief Engineer, Chicago, Rock Island & Pacific.
F. H. Clark, Gen. Supt. of Motive Power, C., B. & Q.
C. E. Doyle, Gen. Manager, Chesapeake & Ohio.
Wm. Garstang, Supt. Motive Power, C., C., C. & St. L.
J. W. Kendrick, Second Vice-President, A., T. & S. Fe.
J. J. Turner, Second Vice-Pres., Penn. Lines W. of Pittsburgh.
C. S. Churchill, Chief Engineer, Norfolk & Western.

Committee on Relations Between Railroads.

Arthur Hale, Gen. Agt., The Am. Ry. Assn., Chairman.

E. W. McKenna, Second Vice-Pres., C., M. & St. P.
W. G. Bierd, Gen. Supt., New York, New Haven & Hartford.
W. L. Park, Gen. Supt., Union Pacific.
M. Trump, Gen. Supt. Transportation, Pennsylvania.
C. H. Ackert, Vice-Pres. and Gen. Manager, Southern.
W. G. Brownlee, Gen. Transportation Manager, Grand Trunk.
Henry Miller, Vice-President and General Manager, Wabash.
H. J. Merrick, Supt. Freight Transportation, L. S. & M. S.
J. M. Warner, Gen. Manager, Chicago & Western Indiana.

Arbitration Committee.

Arthur Hale, Chairman.

Arthur Hale, General Agent, The American Railway Assn.
J. M. Warner, General Manager, Chicago & Western Indiana.
W. J. Jackson, General Manager, Chicago & Eastern Illinois.
F. E. Ward, General Manager, Chicago, Burlington & Quincy.
L. G. Haas, Agent for the Receivers, Seaboard Air Line.

Committee on the Safe Transportation of Explosives and Other Dangerous Articles.

C. B. Dudley, Temporary Chairman.

C. B. Dudley, Chemist, Pennsylvania.
N. D. Maher, Second Vice-Pres. and Gen. Mgr., N. & W.
W. B. Scott, Asst. Dir. of Main. and Op., U. and S. Pac. Sys.
Theo. Voorhees, Vice-President, Philadelphia & Reading.
O. S. Keith, Supt. of Transportation, Illinois Central.
(One vacancy.)
W. C. Nixon, Vice-Pres. and Gen. Mgr., St. Louis & San Fran.
E. H. Fitzhugh, Third Vice-Pres., Grand Trunk, Montreal, Que.
(One vacancy.)

Committee on Electrical Working.

George Gibbs, Temporary Chairman.

J. F. Deems, Gen. Supt. of Motive Power, etc., N. Y. C. Lines.
J. D. Isaacs, Consulting Engineer, Union & Southern Pacific.
W. J. Harahan, Asst. to President, Erie.
C. S. Sims, 2d Vice-Pres. & Gen. Mgr., Delaware & Hudson.
L. C. Fritch, Consulting Engineer, Illinois Central.
Geo. Gibbs, Chief Engineer of Electric Traction, Long Island.
E. H. McHenry, Vice-Pres., New York, New Haven & Hartford.

Special Committee on Conference on Car Demurrage Rules.

Arthur Hale, Chairman.

Arthur Hale, General Agent, The Am. Railway Association.
Clyde Brown, General Solicitor, New York Central Lines.
E. B. Boyd, Asst. to Vice-President, Missouri Pacific.

The Tauern Railway, the new Alpine line connecting Gastein and Spittal, was opened on July 5. So great were the engineering difficulties that, although the line is only 30 miles long, the cost was very high. Eight years were required for the completion of the Tauren tunnel. The railway greatly shortens the distance between Central Europe and the Adriatic.

THE McCLINTOCK INTERLOCKING RELAY.

The accompanying engravings illustrate the mechanism of the McClintock interlocking relay as used for crossing bells on single track, where the bell must be so controlled as not to be rung by a train moving away from the crossing. Fig. 1 shows the relay assembled; that is, two relays on a single base. The contacts consist of platinum points 1, 2, 3, 4, fused into circular glass tubes, R, R', from which the air has been exhausted and which contain mercury, as shown by dotted lines. These tubes or rings are supported by fiber clamps, C, C', mounted on square shafts pivoted in supports, d, d'. Rods f, f', attached at their upper ends to projections from the armatures L, L' of magnets M, M', move the mercury rings. In Fig. 1 both of the magnets are shown energized. Interlocking arms x and y are secured to the ring shafts as are also the counterweights W, W'. Spiral leads composed of a number of fine insulated copper wires connect the platinum points with binding posts 1', 2', 3', 4'. These binding posts have square shanks to prevent turning and are mounted on a marble slab which also supports the magnets. The marble slab rests on a glass circular shield, h, h', which rests on a metal base. Screws passing through the marble slab and the metal base serve to hold the parts together.

The operation of the relay may be understood by reference to Figs. 2, 3 and 4. In Fig. 2 the left-hand magnet (M) being de-energized, ring R has revolved sufficiently to bring the

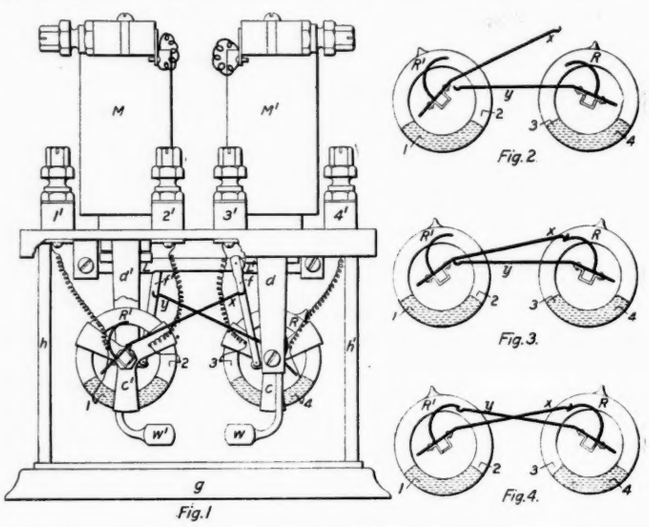


Fig. 1

McClintock Interlocking Relay.

mercury into contact with both platinum points, thereby forming a path for an electric current to ring the bell. In Fig. 3 both magnets are de-energized, as when a train is partly in both track sections opposite a bell. It will be observed that arm x rests against the stop carried by the shaft of ring R, thereby preventing ring R' from revolving sufficiently to make contact through the mercury between points 1 and 2. In Fig. 4 magnet M has picked up its armature but magnet M' is still de-energized, as when a train has passed the bell and entered the second track section. Here arm y has caught under the stop carried by the shaft of ring R', while arm x still rests against the stop carried by the shaft of ring R. In this position should magnet M become de-energized again, ring R could revolve to make contact, as would be required in case a second train should follow another and enter the first track section before the leading train had left the second. When both magnets pick up the apparatus assumes its normal condition, as shown in Fig. 1. In addition to the rings shown others can be provided to close local circuits either when the magnets are either energized or de-energized.

This relay is made by the McClintock Mfg. Co., St. Paul, Minn.

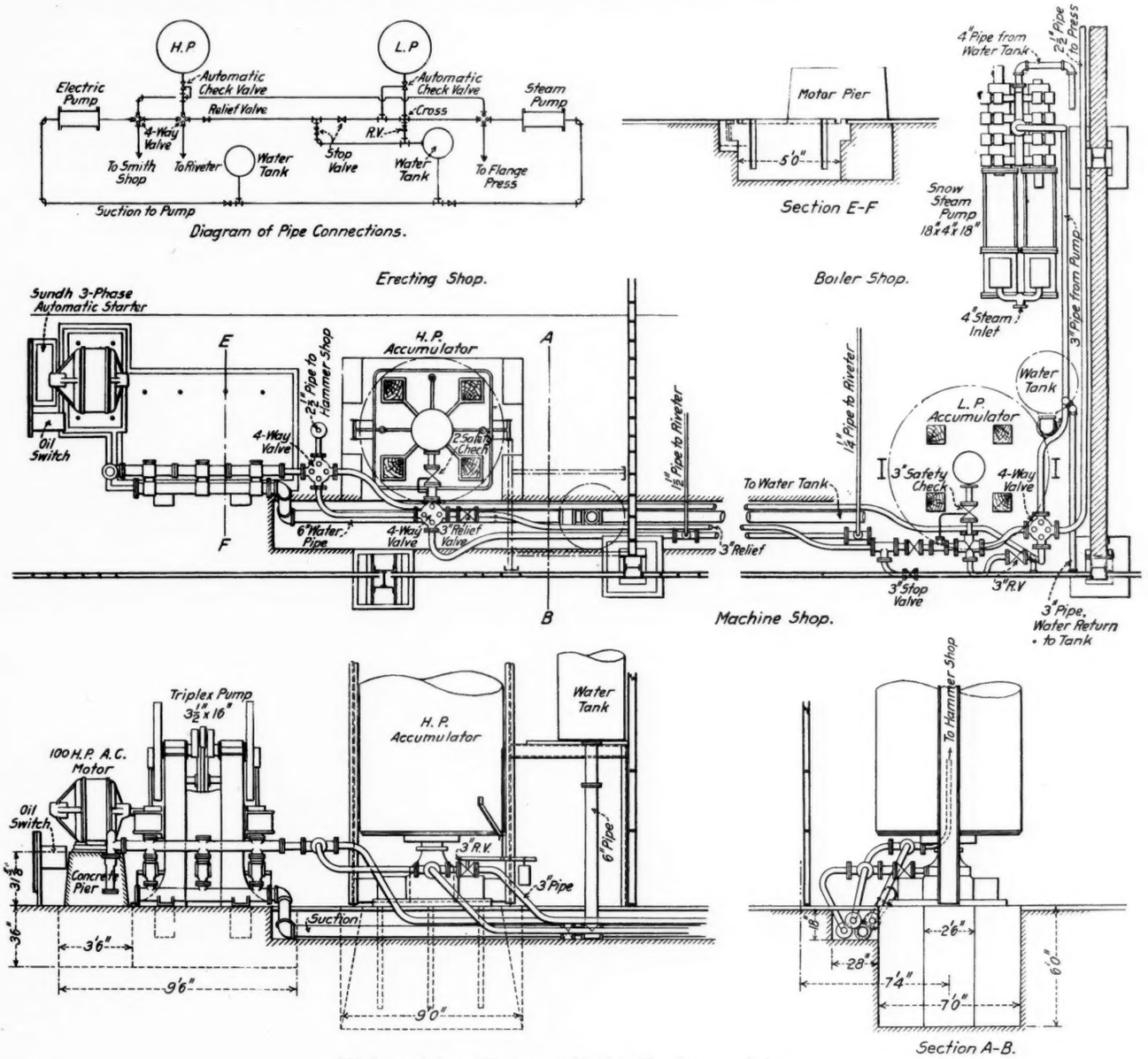
A SYSTEM OF HIGH AND LOW PRESSURE HYDRAULIC ACCUMULATORS.

BY R. F. WILLIAMS,
Shop Engineer, Montreal Locomotive Works, Ltd.

An interesting hydraulic system has recently been installed at the Montreal works of the American Locomotive Co., New York, consisting of two accumulators and two pumps, one accumulator being operated at a slightly higher pressure than the other. The relief from the high-pressure accumulator, instead of discharging directly into the pump supply tank, is piped to the low pressure accumulator and thence into the pump supply tank. With such an arrangement, there is always high-pressure water available, even when the demand is excessive on the low-pressure accumulator.

A motor-driven pump runs continuously and supplies both accumulators with water for ordinary work. A steam pump is automatically cut in by the low-pressure accumulator to take care of any excessive demands on the low-pressure system. The large flanging presses on the low-pressure side work intermittently, and require large amounts of water. By this arrangement, the small electric pump can store up water in the low-pressure accumulator when the flangers are not working, and when they start again the steam pump will help out if necessary for extreme variations in demand. This is provided for by having a butterfly valve, on the steam pump, which is opened and closed by a lever actuated by the motion of the low-pressure accumulator. When the accumulator is down it opens the butterfly valve, thus starting the steam pump, which pumps directly into the low-pressure accumulator. When the low-pressure accumulator reaches its high point it closes the steam supply, thus shutting down the steam pump. Should the accumulator go up still higher, due to water coming over from the electric pump, it will open a relief valve and exhaust into the pump supply tank, thus relieving the pump of any pressure. There is no necessity for a separate control for the high-pressure accumulator, as the capacity of the motor-driven pump is figured so that it can operate continuously taking care of the average loads.

The piping as shown on accompanying drawings is arranged so that the control valves are brought together in one casting, or change block, which is a special bronze four-way valve. This makes them very easily accessible, allowing the operator, in case of breakdown, to cut out any pump or accumulator or any line of service pipe without interfering with the operation of the remainder of the plant. Considerable

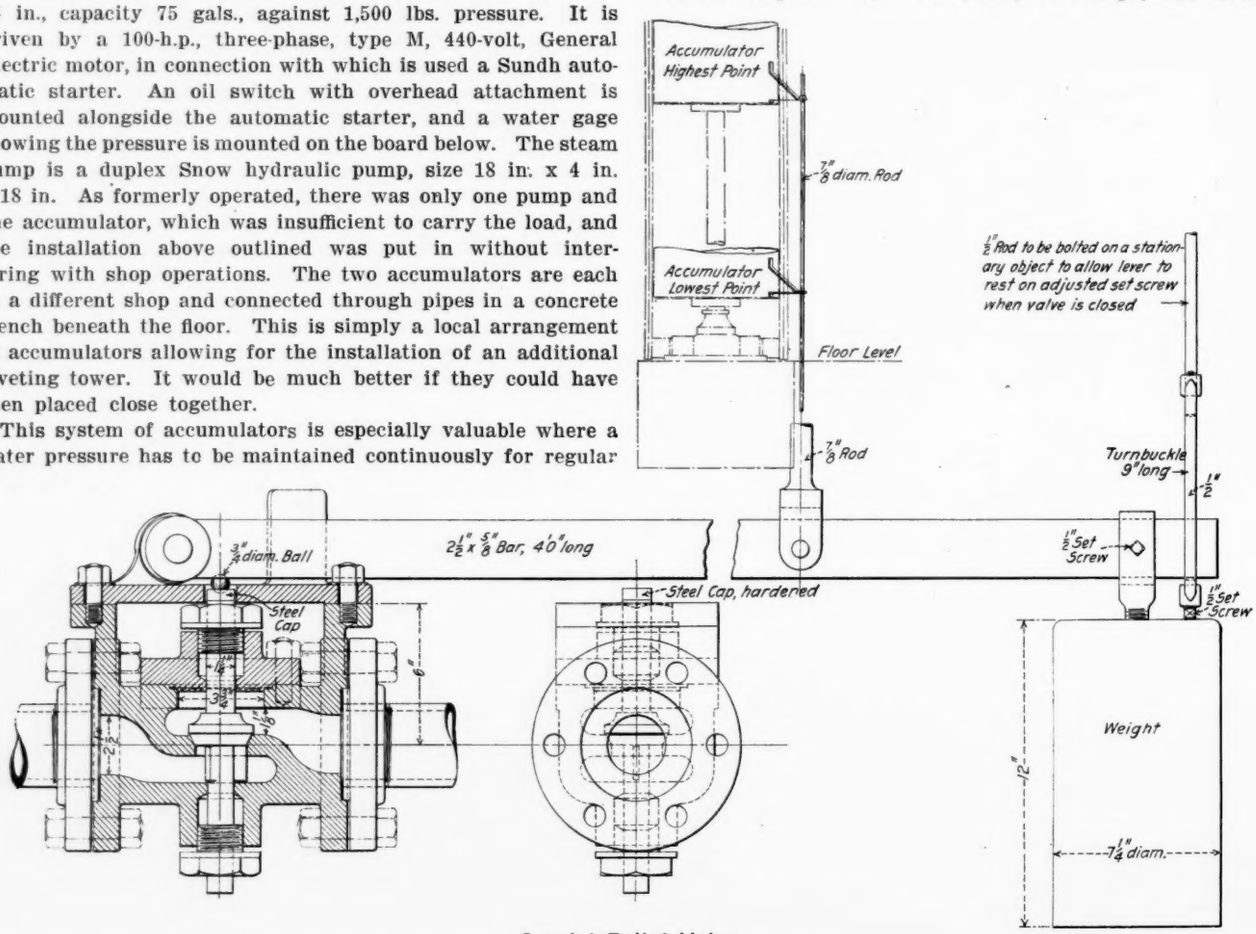


High and Low Pressure Hydraulic Accumulators.

difficulty was experienced with the relief valves at first, due to their too sudden closing. This produced water hammer in the pipes and kept the accumulator continually dancing up and down. The original valves were of the spring relief type, and the trouble was overcome by developing the special relief valve shown by the accompanying drawing, which will relieve the water under 1,500 lbs. pressure without hammering action of any sort and keep the accumulator stationary while relieving.

An automatic check valve next to each accumulator prevents them from dropping in case of a burst in the line. The pump supply tanks are fed by a Davis balanced float valve. The motor-driven pump is a Gould Triplex, size 3½ in. x 16 in., capacity 75 gals., against 1,500 lbs. pressure. It is driven by a 100-h.p., three-phase, type M, 440-volt, General Electric motor, in connection with which is used a Sundh automatic starter. An oil switch with overhead attachment is mounted alongside the automatic starter, and a water gage showing the pressure is mounted on the board below. The steam pump is a duplex Snow hydraulic pump, size 18 in. x 4 in. x 18 in. As formerly operated, there was only one pump and one accumulator, which was insufficient to carry the load, and the installation above outlined was put in without interfering with shop operations. The two accumulators are each in a different shop and connected through pipes in a concrete trench beneath the floor. This is simply a local arrangement of accumulators allowing for the installation of an additional riveting tower. It would be much better if they could have been placed close together.

This system of accumulators is especially valuable where a water pressure has to be maintained continuously for regular



Special Relief Valve.

work, and in addition provide a supply for any large intermittent demand without disturbing the pressure on the rest of the system. In locomotive and boiler shops, for instance, a constant pressure is required for hydraulic cranes, riveting towers, portable riveters, etc., also a large amount of water is required for the large flanging presses operating intermittently. By such an arrangement as outlined smaller pumps can be used than would otherwise be necessary. At Montreal exceptional electrical power rates are obtained, so that it is much cheaper to use the motor-driven pump operated continuously than to use the steam pump.

BOSTON & MAINE PENSION SYSTEM.

As already announced in these columns, the Boston & Maine has procured the passage of an act by the legislature of Massachusetts authorizing the establishment of a pension system for its employees, though the company has not yet decided when it will take advantage of the act. The law is chapter 435 of the acts of 1909. It authorizes the organization of a pension association. All employees may become members; those desiring to stay out must give notice in writing within three months after the date of beginning business; all entering the service after the association is organized must become members, but temporary and joint employees may be excluded, by rules to be adopted by the trustees. The permissive and compulsory age limits for retirement from service are left to be decided by the trustees. The association shall be established only on a vote of the directors of the road and a two-thirds vote of the employees voting on the question.

Three trustees are to be appointed by the directors of the road, three elected by the association and a seventh chosen by the other six members. The six trustees first named serve without compensation, but they may vote to pay the seventh. The trustees shall adopt mortality tables, rates of interest and other fundamental features, subject to the approval of the state insurance commissioner and the s ate actuary.

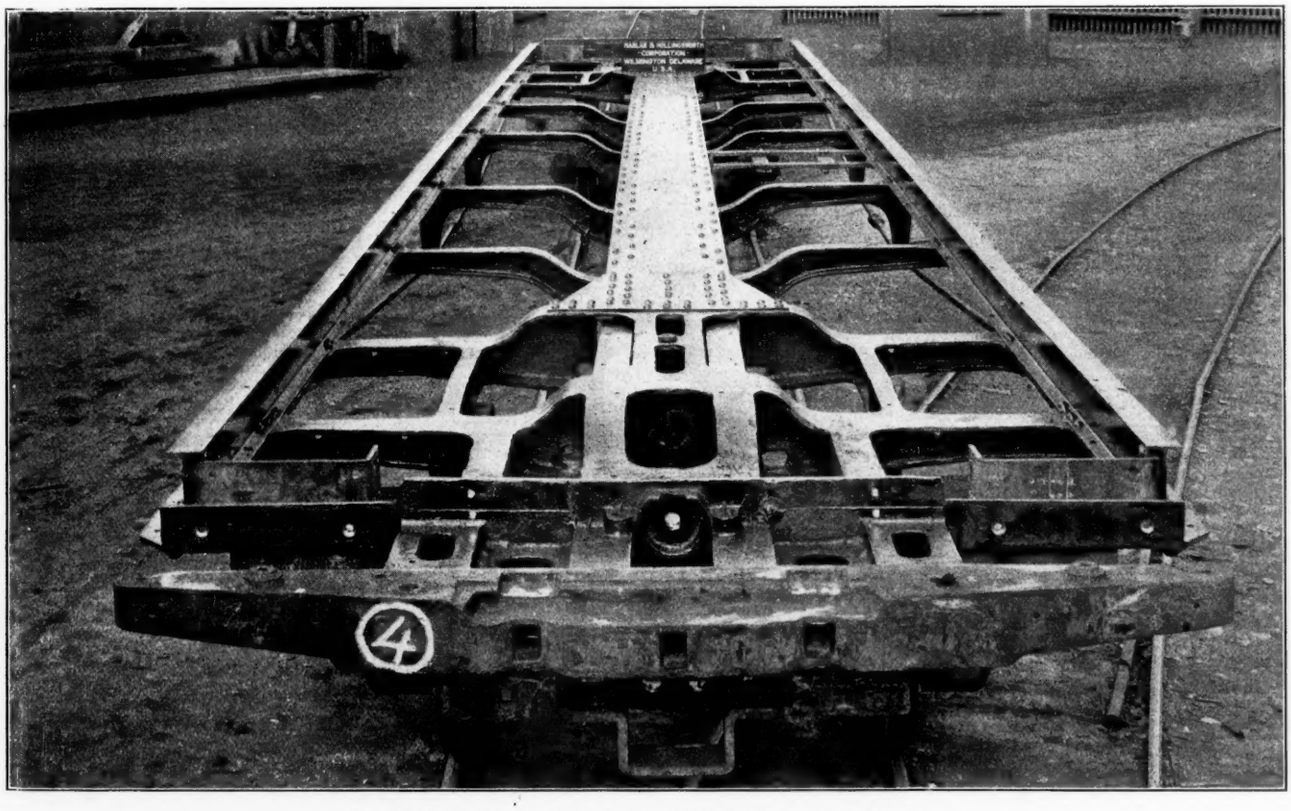
Each member joining the association pays an entrance fee of $1, and subsequent annual fees of 50 cents, and these payments shall be duplicated by the railway to form a fund for expenses of administration. Each pay day each member shall deposit in the annuity and pension fund a certain percentage of his wages; the percentage, not exceeding 3 per cent., is to be determined by the trustees, subject to the approval of the directors of the road. By approval of the directors and of two-thirds of the members, the assessment may be made more than 3 per cent. The fund contributed by the employees is to pay annuities, and an equal fund, to be contributed by the railroad, is to be used to pay pensions. There is a provision that the sum contributed by the railroad may at any time be increased or diminished by the directors of the road. Any member may authorize the railroad to make additional deductions from his wages, to provide for additional annuities. A member who leaves the road shall have his money refunded without interest; if one dies before having served years enough to

entitle him to a pension his legal representative shall be entitled to the money he has paid, with interest, and a member forced to retire on account of disability, due to accident or disease, before becoming entitled to a pension shall have his money back with interest. From the fund contributed by employees payments may be made in the form of life annuities payable monthly, or life annuities payable monthly with the provision that in the event of the death of an annuitant before receiving payments equal to the sum of his deposits, with interest, the difference shall be paid to his legal representatives. Members retiring under the regulations, at the proper age, shall receive pensions according to their service in the past; that is to say, though the association may have been running but a short time and the employee may have contributed but a small sum in the aggregate, the railroad company will pay him pensions based on his past service. This means that, for example, if the association shall be established in 1910, an employee who shall retire in 1911, who has been in the employ of the company 30 years, will receive an annuity based on one year's service, but a pension *from the road* based on 30 years' service. The trustees may decide what an employee's average wages have been in the past. The pension system shall not be deemed to be an insurance company under the laws of the commonwealth. The insurance commissioner and the state actuary shall have access to the books, papers and securities to examine them; and they are to make an examination at least once a year. If any law is violated, the insurance commissioner may go to the Attorney-General with a view to prosecuting the offender.

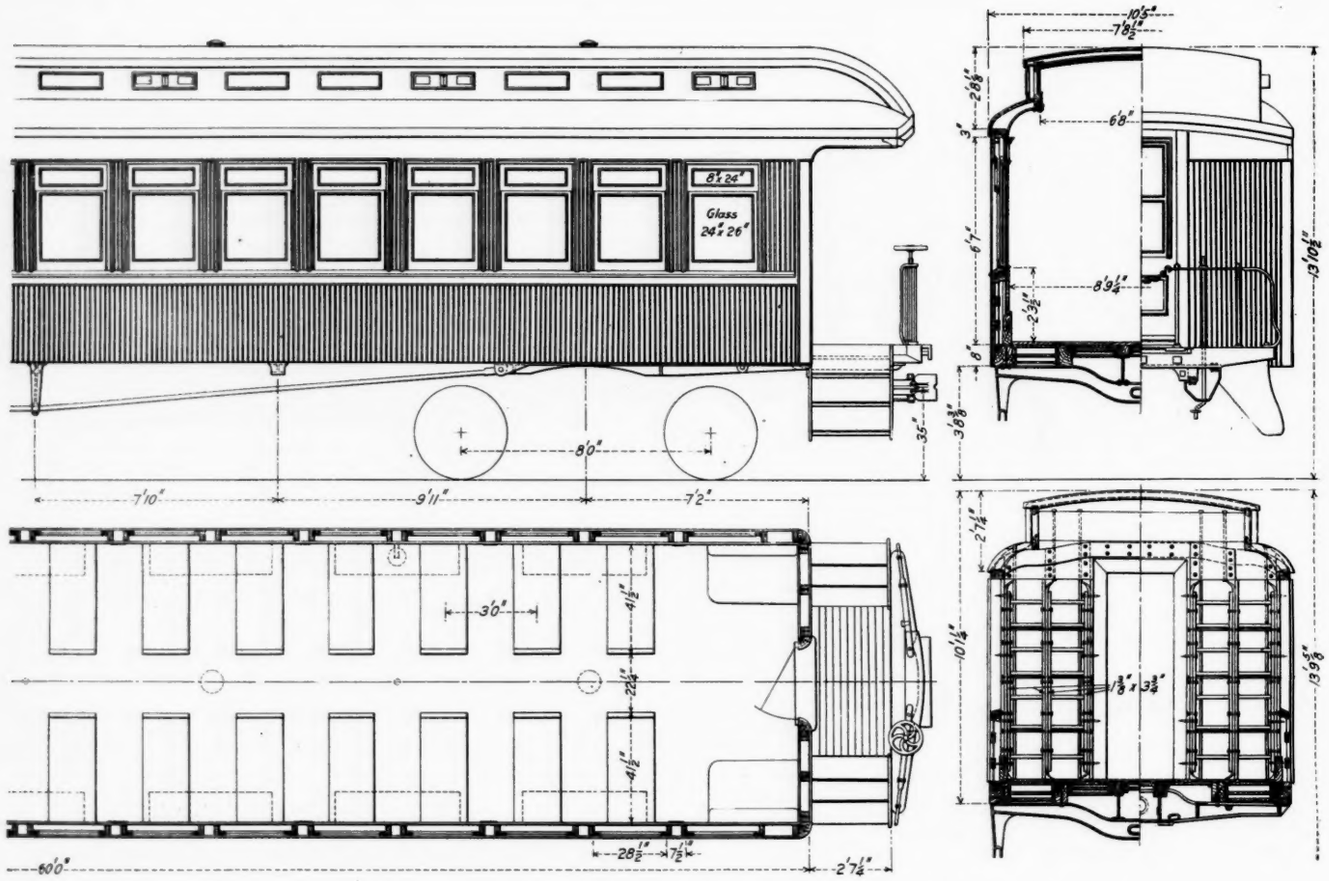
COACH WITH STEEL UNDERFRAMES FOR THE CENTRAL OF NEW JERSEY.

The 15 coaches built for the Central of New Jersey by Harlan & Hollingsworth Corp., Wilmington, Del., are notable, principally for the new design for metal underframe, which is a composite cast steel, structural steel, wood and truss rods. For this reason we have obtained the drawings for its illustration in detail. The car body is wood with the usual end reinforcement made of 1⅜-in. x 3¾-in. bar iron. These cars will have a capacity of 74 passengers, and with four-wheel trucks will weigh 90,000 lbs. They are 60 ft. long over end sills and 9 ft. 8 in. wide over side sills; and 59 ft. 3½ in. long and 8 ft. 10½ in. wide inside. The other principal dimensions are shown on the drawings. The truck has 36-in. forged steel wheels, and the axles have M. C. B. 5-in. x 9-in. journals. The truck frame bolster and spring plank are cast steel furnished by the Commonwealth Steel Company, St. Louis, Mo. The wheel pieces have a rectangular shape, much like the wooden ones they have replaced, the outside dimensions are 4⅞ in. x 9 in., and the cast metal is ½-in. thick. The equalizers are 2 in. x 9 in. at the middle section. The brake beams are the Waycott high-speed type.

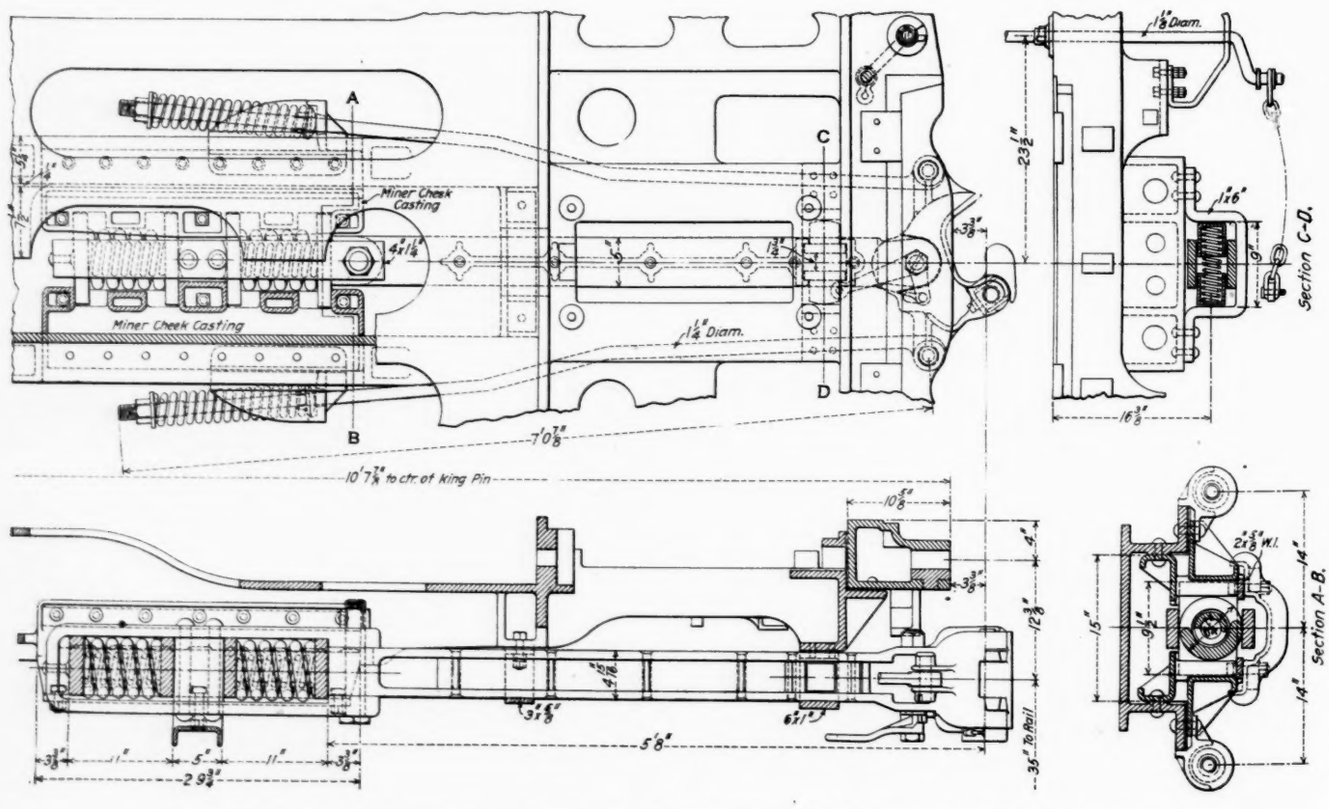
Referring to the detail drawing of the underframe, it will be seen that the end portion from a point 2 ft. 4 in. back of the center plate and extending forward to the end of the platform is a solid steel casting. This includes the center plate, the double body bolster and the platform, and was designed and furnished by the Commonwealth Steel Company. The center sills, which are 10-in. I-beams, 35 lbs. per foot, extend to the web of the front member of the body bolster, and the two side sills, which are 8-in. I-beams, 18 lbs. per foot, extend clear through to the oak end sill, which is 7 in. x 8 in. The center sills are spaced 13⅜ in. between inside flanges and have a top cover plate, ¼-in. thick, extending the whole length between the cast steel ends, with a ⅜-in. gusset plate, 3 ft. 1 in. wide, at the intersections. These rolled sills rest on top of four cast steel cross bearers, which are distributed between the bolsters. Two of these castings have legs extending down and forming the posts for the two truss rods. These rods are 1⅝ in. in diameter with ends upset for 1⅞-in. turnbuckle. The construction of the metal portion of the underframe is clearly shown in the half-tone engraving. Referring to the cross section of the car, the wooden portion of the construction is there plainly shown. There are two intermediate sills of pine, 5 in. x 8 in., and the steel side sills



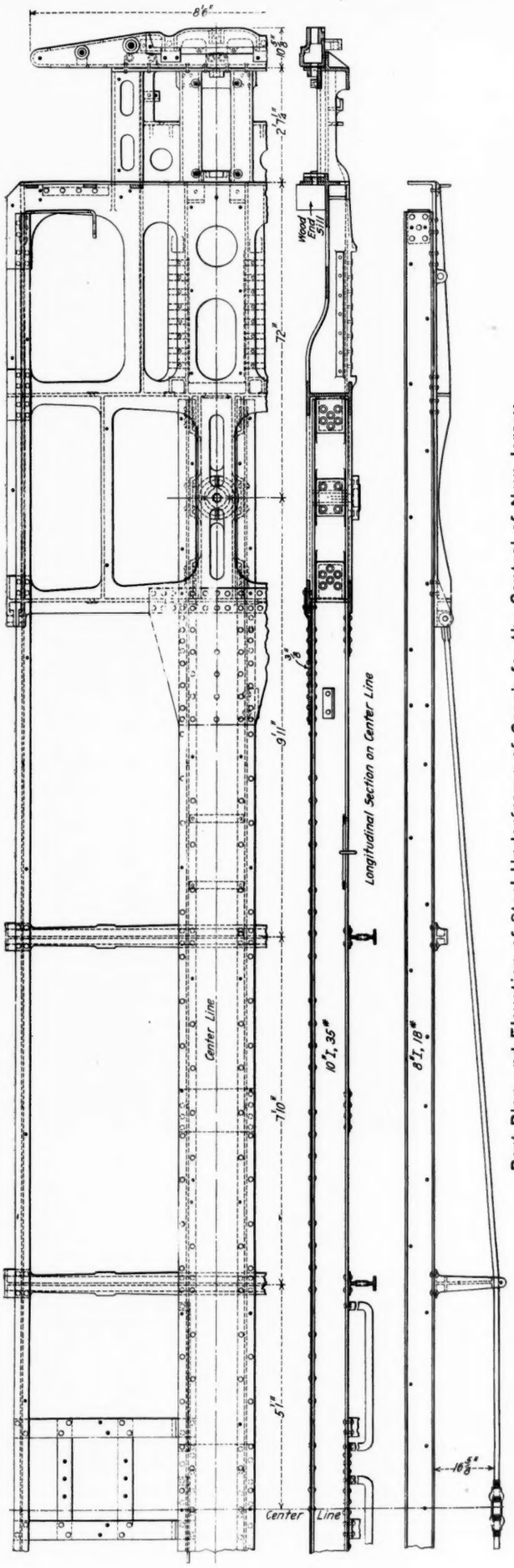
Steel Underframe for Central of New Jersey Coach.



Elevations, Plan and Sections; Steel Underframe Coach for the Central of New Jersey.



Part of Steel Underframe, Showing Application of Miner Draft Gear and Three-Stem Coupler.



Part Plan and Elevation of Steel Underframe of Coach for the Central of New Jersey.

are covered by pine 4½ in. x 8 in. on the outside and 2 in. x 8 in. on the inside. The floor and posts are secured to these wooden sills, and the usual construction for wooden cars is used in the superstructure, which is further illustrated by the floor plan and side elevation.

The application of the Miner draft gear and 3-stem coupler, as worked out for the steel end casting and platform, is here shown in detail. The coupler head has side lugs to which are attached 1¼-in. rods, extending back to long spiral springs which have a bearing on the bracket bolted to the draft casting. The drawbar yoke is 4 in. x 1¼ in., and it encloses the tandem springs and four followers, 1½ in. thick. The plates in the steel casting surrounding the draft gear are 1¼ in. to 1½ in. thick, and the whole construction is very strong and substantial and a great improvement over the former practice, when wood was used in this part of the car, which is constantly subjected to heavy jerks and blows. The coaches are lighted with Pintsch gas one-flame mantle lamps of the Safety Car Heating & Lighting Company, New York. We are indebted to W. McIntosh, Superintendent of Motive Power, for the drawings and photograph which are here illustrated.

RAILWAY SANITATION.*

BY DR. J. N. HURTY.

Clean stations and cars are merely a matter of cleaning. The offices or lobbies of first-class hotels are always clean, and this is accomplished by constant cleaning. Cars and stations, with some few exceptions on account of extraordinary circumstances, can be constantly undergoing the cleaning process. It is a mere matter of extending the service to the cars of local trains and the stations of small places. The fare, with rare exceptions, is the same on locals as on through trains, and expense only stands in the way of local trains being kept as tidy as through trains..

Cars are now fitted up in a way to discourage accumulation of dirt, and make cleaning easier. I regret to record, however, that the coca matting strip or the carpet strip in the aisle, with interstices filled with filth and microbes, is still too frequently in evidence. Improved sanitary conditions would be secured and a not insignificant expense saved if the aisle strips were abolished. There would be no objection to fluted rubber strips, if it is desirable to make the foot-hold better, and relieve bareness. As concerns upholstering, I do not know how to get rid of plush. It seems to be the only thing available. Passengers cannot sit on hard polished wood or metal seats, or cane seats, when riding long distances, for they are too uncomfortable. Leather is absorbent, cold, slick and uncomfortable. Plush, therefore, is the only thing, and objectionable as it is, we must stand it and be content with frequent dusting with compressed air and frequent sterilization. In new cars the closets are larger than in the old cars, the flush hopper is a great improvement and the placing of water coolers on the exterior prevents the absorption of effluvia by the water, and also prevents the depositing of diapers in them as I know has actually occurred.

Now what must the passengers do? I would say—let the men follow the example of the women. The women do not spit on the floor and there is not the slightest excuse for the men doing it. Spitting is usually a nasty, dirty, filthy habit, and has no part with a gentleman. If a man has catarrh, grip or consumption, he should for decency's sake, also to prevent spreading his disease to others and to prevent the very possible reinfection of himself, carry a sputum cup or paper napkins. The litter made by certain people in their seats, on the floor, and even in the aisles, proclaim their kind. Of course, we excuse the pale, over-worked and poor woman with her three children when crumbs, pie, jam and saliva are spread over the backs and bottoms of the seats. * * * The part of the

*Extracts from a paper by Dr. J. N. Hurty, Secretary of the Indiana State Board of Health.

public in passenger car sanitation is to avoid making litter, not to spit upon the floor, not to smear the seats with the filth that is always carried on shoes and to hold a paper napkin or cloth or handkerchief before the face when coughing or sneezing.

I think every effort is made to keep Pullman cars clean. The company employs a sanitary superintendent, Dr. T. R. Crowder. I know him well, and his zeal is marked. The company sustains him, too. No complaint has ever been made of the Pullman sheets, pillow-slips and towels. But the blankets and mattresses have been suspected of not having had proper attention. It has been suggested that white blankets be used, for their freshness and condition of cleanliness can be seen at a glance. To this, the fact is brought forth that clean, fresh sheets protect the person from the blanket and mattress, and besides, soot or like dirt is not disease-causing and is not filth. Further, it is quite impracticable to wash blankets as frequently as sheets, and no housekeeper does it. Hence the use of colored blankets. Late berth improvements are—curtains of a material less absorbent than tapestry, and a clean sheet on top of the blanket. The floors of wash rooms and closets are now covered with linoleum instead of carpet. Some sleepers now have a special place for mouth washing. One of the most serious, unsanitary features of railways is the continual polluting of the road-beds with infected human feces and urine.

Dr. Hurty here goes on to discuss at considerable length facts, known to the medical fraternity, which indicate that considerable numbers of persons with mild typhoid fever are traveling on the cars all the time. Continuing he says: I believe that the proportion of typhoid patients that travel, either to their homes durin the early stages of infection, or back to their homes during the equally infectious stage of convalescence, is very large. Contract doctors send them away from the mines, factories, etc., once a diagnosis is made; summer resorts and other hotels show them the door even on suspicion. The years of typhoid susceptibility are also the years of one's life when the lust of travel burns freely in the blood. If the proportion of sick to well on the railway is anything like the proportion of sick to well shown by statistics, namely, 460 typhoids to 100,000 of population, then with eighty-five thousand passengers to the mile, annually, we would have over three hundred and seventy cases of typhoid traveling over each mile of road in the United States each year. I believe that the Old Trunk lines of the United States are already infected for practically their entire length. Dr. Hurty thinks also that typhoid occurs more frequently in railway towns and in farm houses near railways than in other places. From experiments which he has made he concludes that the dust of the roadbed, thrown up by passing trains, lodges in reservoirs and other places whence it finally goes down people's throats. Continuing, he says: I think all will agree as to the very great probability of the dissemination of typhoid and diarrhœa infection from polluted railway roadbeds. Then what is the remedy? I can see only one way, and that is to compel by law the construction of retention closets. This would not be so very difficult. Beneath the hopper, place a tight metal removable box containing dry earth, and in some handy way supply dried earth to be used after each service of the closet as water is now used. Other absorbent material beside earth could be used and chemical disinfectant added if desired. The emptying of the boxes and the safe disposal of their contents could be attended to with small expense, and no offense to the senses.

VENTILATION.

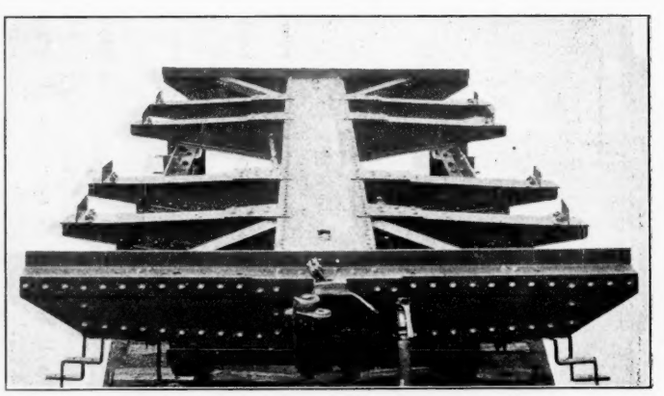
Air we must have. The average cubical contents of six passenger coaches measured by myself was 4,265 cubic feet. The seating capacity was sixty-four persons. As each person requires thirty cubic feet of fresh air per minute, it follows, if the full quota of passengers is on board, that 1,920 cubic feet must enter and leave each minute. In other words, over one-third of all the air in the coach must be displaced by fresh air in the time named. The author then goes on to discuss ventilating apparatus and describes the system in use on the day cars of the Pennsylvania Railroad, where air is admitted through vertical ducts at the ends of the car and is distributed—warmed or not, as may be needed—by horizontal ducts running along the sides of the car beneath the seats. This system does excellent work when the cars are in motion and if intelligently attended to, but it fails when the car stands still. For several reasons, the lack of space being the principal one, this system is not applicable to Pullman and trolley cars. But for day and parlor cars, it is the best method of ventilation yet put into practical operation, and Dr. Dudley deserves the thanks of the public for his invention and for inducing his company to install it.

Lastly, I have to present my own plans for car ventilation. They have had one practical trial which was not wholly satisfactory, owing, as I believe, to faulty installation. The plan is to modify the Dudley system by permanently closing all openings in the deck and remove the foul air from near the floor through four ducts placed within the closets and washrooms at each end, the said ducts to lead from the car beneath the end seats. These ducts, surmounted by aspirating hoods, should open into the car at the floor, and a short arm or spur from the steam-heating pipes should be in the ducts to heat the air therein and cause it to rise. There would then be four ducts, two at each end, in the car, and whether moving or standing still, they would suck the foul air out.

Dr. Hurty presents a copy of the rules of the Indiana Board of Health prescribed for the guidance of railways in the sanitation of cars.

HICKS HEAVY CABOOSE CARS.

The Hicks Locomotive & Car Works, Chicago, has recently built, for the Carolina, Clinchfield & Ohio, 15 steel underframe, four-wheel caboose cars. As this road has severe grades and at several places uses pusher locomotives, the framing of



End and Top View of Steel Underframe.

these cars has been designed to have sufficient strength to withstand the push on the rear end of the train.

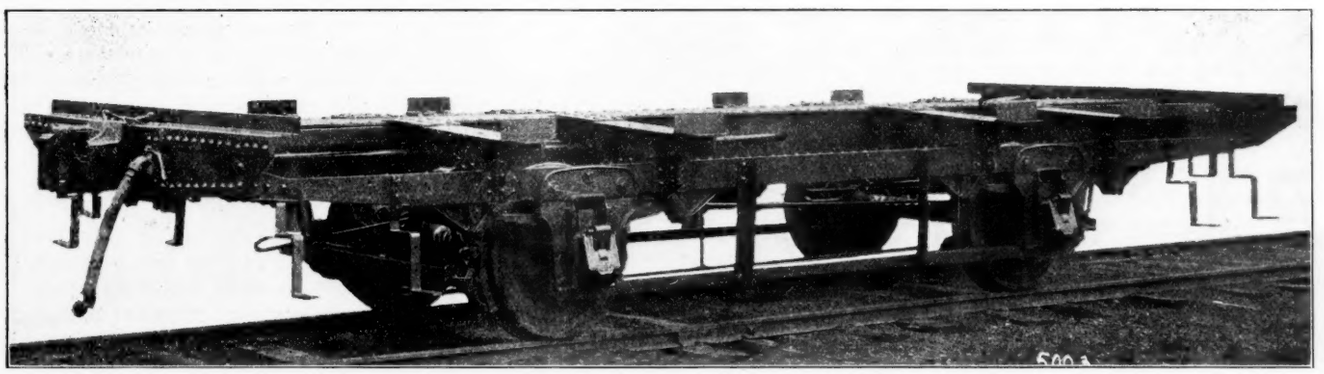
The accompanying illustrations show the general appearance of the completed car and of the steel underframing. The general dimensions are as follows:

Length over body	18	ft.	1⅝ in.
Width over body	9	"	1⅝ "
Inside length of body	17	"	5⅜ "
Inside width of body	8	"	3⅜ "
Height from sill to plate	6	"	11 "
Length over underframing	23	"	2 "
Width over underframing	9	"	0 "
Wheel base	10	"	9 "
Journals	4½ in. x 8	"	
Diameter of wheels	33	"	

The steel underframing is built up of standard shapes, plates and bars of open hearth steel, conforming to the standard specifications of the Association of American Steel Manufacturers. The center sills are 12-in. channels, weighing 20.5 lbs. per ft., and the pedestal sills are 6-in. x 4-in. x ½-in. angles. Wooden sills arebolted to the underframing, the end sills

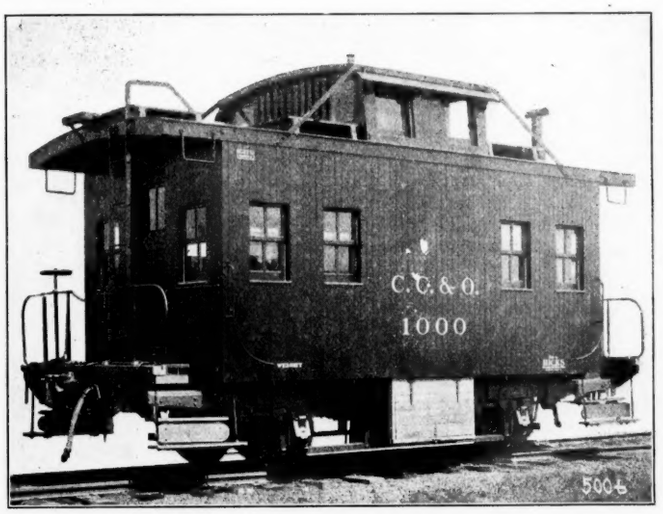
being of oak and the longitudinal sills of yellow pine. The framing of the car is also of yellow pine, reinforced with ¾-in. rods and iron bands. Bolts aregenerally used instead of lag screws throughout the construction of the car. The floor is in two layers, the lower course being 1¼-in. and the upper course ⅞-in. plank, tongued and grooved.

Minor draft gear, with triple-coil draft springs of 26,300 lbs.



Steel Underframe of Caboose Car for the C. C. & O.

capacity each, are used. The coupler is a 5-in. x 7-in. cast steel "Major," with solid knuckles, operated by Acme uncoupling attachments. The running gear is heavy, with pedestals of cast steel and pedestal ties of 3-in. x 2½-in. angle iron. The spring link brackets of cast steel are suspended from the springs by wrought iron links. McCord malleable journal boxes are used. The car has Westinghouse automatic freight car brakes, with an 8-in. x 12-in. cylinder and K-2



Carolina, Clinchfield & Ohio Caboose Car.

triple valve, and also hand brakes at each end of the car. A standard Westinghouse conductor's valve is installed in the cupola. The interior of the car is provided with six bunks, a water tank, wash stand, lockers and a Spear stove. These cabooses are of particular interest on account of their being designed unusually strong.

The city of Moscow, first among Russian cities, has a belt railway, recently opened. It was planned in 1869, laid out by the government in 1898, and begun in 1903. It is 34 miles long, double tracked, and has 14 stations and 5 stopping places. On the south and west it follows closely the city limits; on the north and east it is 3½ to 4 miles outside of them. There are no crossings at grade, to avoid which 290 bridges and viaducts were built, 4 over the Moskwa river, 13 over other railways and 70 over streets. Nine of the ten railways which enter Moscow have connections with the belt line for freight. The work has cost $19,700,000.

COMPRESSED GAS AND ELECTRIC CAR LIGHTING.

BY GEO. L. FOWLER,
Associate Editor *Railroad Age Gazette.*

Some 17 years ago a small book on car lighting was issued by one of the technical papers, in which the various systems were carefully reviewed and their merits and demerits succinctly set forth by the authors. The book drew considerable attention to itself at the time and aroused more or less controversy. Since that time there has been, so far as I am aware, no thoroughly comparative study made of the subject, though rapid strides have been taken all along the line and a number of systems of car lighting have been developed and put upon a commercial basis that did not exist at the time of the appearance of the book referred to. It was for the purpose of contributing something to the present knowledge on the subject that the inquiry which forms the basis for this article was undertaken. In it, it was decided to cut loose from all connection with the manufacturers of the several devices under investigation, except so far as information regarding structural features were concerned, and to depend entirely upon information obtained from the railways for data as to the character of operation and its cost. As it has been impossible to visit and investigate every plant in the country, it is evident that some of the figures will be at variance with those that may be presented by manufacturers to their customers, and may be subject to correction.

For obvious reasons, the railways from whom the information was obtained will not be named, but they were all roads of high standing and the figures given are taken from their own official reports, while the data regarding operation were obtained from employees in direct charge of the car lighting, who were instructed to give such information as might be desired. This statement is made as a guarantee of good faith, and to give what credit it may, to the authenticity of the figures and facts presented, and these must be regarded solely as that of a personal experience.

Since the date of issuance of the book referred to there has been so great a development in the art of car lighting that it almost amounts to a revolution. Systems that had been established for years and seemed to be firmly seated in the saddle have disappeared and given way to others that are better both from the standpoint of the quality of the light and the price at which it is supplied.

In their places we have the exceedingly wide range of application of compressed oil gas or Pintsch light and the growing use of electricity, with a limited use of acetylene. Although this investigation included not only the systems of compressed gas and electric lighting, but also the four systems of acetylene now bidding for favor, the limits of space require that this article shall be confined to the first two.

The Pintsch gas system is based upon the gasification of crude oil in retorts. The gas so produced is compressed to a pressure of from 12 to 15 atmospheres and delivered to storage tanks carried on the cars to be lighted. It is burned

either in an open flame lamp or in one designed to use an inverted mantle. Actually, the making of the gas is almost invariably done by the manufacturers of the apparatus, and sold to the railway companies at a fixed rate per 1,000 cu. ft. so that the estimate of cost is a simple matter, as there is no charge to be made for interest, depreciation or operation of the generating plant, and the charge to the installation and maintenance of the cars is easily arrived at.

Of electric systems there are three: the head end system, where a dynamo is placed in the baggage car and is used to generate a current for the lighting of the train; the axle-light, where a dynamo is driven by a belt from the car axle, which is expected to not only maintain the lights but to charge a storage battery for use when the car is standing, and the storage battery system.

ELECTRIC LIGHTING.

The well-known system of electric lighting in which a dynamo is placed in the baggage car, and which originated on the Chicago, Milwaukee & St. Paul, is used quite extensively, and among other places on some transcontinental trains. The criticism of the system as expressed by the men is the old one that the baggage car dynamo is a heavy draft on the steaming ability of the locomotive; and, when the pressure falls, the engineer will shut it off and allow the lamps to draw on the batteries until the latter are nearly exhausted; a practice that leads to a rapid deterioration and expensive repairs. Where no batteries are used there is no such trouble, but in that case the train must be short.

On one transcontinental line the electrically-lighted trains require the constant service of 10 electricians at a salary of $85 per month each for the 10 trains that are operated. They ride through to the coast.

There is a storage battery on each car, and on one train there is a large set on the baggage car and another on the observation car, and these are capable of lighting the whole train for one hour. The batteries are charged direct from the dynamo with the resistance coils on.

It would be useless to go into a detailed description of this method as it does not differ essentially from the one which has been so often described on the Chicago, Burlington & Quincy, with which most of the readers of the *Railroad Age Gazette* are familiar and which has been repeatedly described in the technical papers, and for which O. W. Ott gives the cost in his paper read before the Western Railway Club in April, 1907, costs that have been checked and approved. This cost, in which he includes a depreciation of 15 per cent. on the batteries with 5 per cent. on the turbo-generator and fittings and interest at 5 per cent. on the original cost, he places at $533.18 per car per year. If we assume that the car is lighted for 1,500 hours during the year the cost becomes 35.54 cents per car-hour.

From another road where both Pintsch gas and electricity developed by an axle-driven generator is used, very complete data was obtained. From these it appears that the chair cars (not parlor cars) averaged about 12,000 miles per month. These cars are 70 ft. long and are fitted with 42 lights of eight candle power each. A ground glass shade was used, but as it accumulates dust very rapidly it soon becomes dirty and it was the intention to change to a smooth opal glass that would not be open to this objection.

The parlor cars and diners are more elaborate in their fixtures and cost about 50 per cent. more to maintain than the chair cars and ordinary coaches. No measurements other than electrical have been made in order to determine the amount of power required to drive the dynamo, but it is estimated that about 3 horsepower is required, and that the efficiency of the dynamo is about 65 per cent. These figures are pure estimates, and until actual dynamometer measurements have been taken under a car in service, there can be no certainty of the amount of inaccuracy involved in the figures. My own experience in checking off calculated measurements of this sort with the work of the dynamometer is that the calculations are invariably too low because of the failure of the calculator to take into account the influence of the multiplicity of forces that are at work, the intensity and direction of which we have no means of determining. This 3-h.p. covers the sleeping car as well as the day coach.

In the vestibuled cars there are 51 lights in all, of which four burn only when the vestibule is open; the contact being made and the circuit closed by the opening of the doors.

From 85 to 90 per cent. of the cars are in service and the depreciation is calculated on the whole equipment with the exception of the batteries and this amounts to about $3 per 1,000 car-miles.

	Failures per car per month.	Cost— Per car per month.	Cost— Per 1,000 car-miles.
1st year	1.51	$35.71	$2.81
2d "	1.27	36.85	2.83
3d "	1.10	36.12	2.61
4th "	1.23	38.04	2.84
5th "	.91	36.89	2.61
6th "	1.46	45.48	3.29

In the accompanying table, the cost was computed by taking the average for each month.

In drawing up the reports on this subject, the calculations are based by the railway company on the number of cars which would be sufficient for the service if used regularly with the scheduled "lay overs." This number is called the "Number of Cars in Service," and runs from 10 to 50 per cent. less than the number of cars equipped. Such a percentage being idle on side tracks or in the shops. This gives us a good basis, but makes the cost appear greater than it really is, because the cost of making repairs and the interest on idle equipment is charged to the "Active Cars."

If we take the reports of the performances of these cars for six years, it will be found that, for the first three years, the average number of failures per month decreased, and then rose again to a point considerably above that originally existing, indicating that as the apparatus became older and deterioration had occurred, it became less reliable; and the same statement holds for the cost per car per month. For example, in six years, the average number of failures per car per month, with the cost per car and per 1,000 miles, is given in the following table:

Cost items.	Business.		Coach, chair & comb.		Dining		Pullman	
	1906.	1907.	1906.	1907.	1906.	1907.	1906.	1907.
Labor and supervision	10.61	13.28	10.61	13.28	19.94	15.91	15.91	19.94
Interest and depreciation	9.74	9.58	8.13	8.28	12.86	11.35	8.54	8.46
Int. on idle equipment	9.38	9.67	1.13	.96	1.60	1.05	.56	.32
New battery plates	3.59	4.47	1.96	2.24	1.36	.38	8.45	6.55
Miscellaneous material	1.06	2.45	1.10	2.42	3.72	1.35	1.30	3.64
Lamp renewals	2.43	3.16	1.09	1.24	3.03	2.88	2.64	3.65
Power	1.56	1.84	1.80	2.11	2.70	2.49	2.93	3.61
Battery jars	1.21	.86	.13	.49	.55	.12	.73	.31
Charging current, trmnls	.53	.73	.26	.37	1.10	.80	.53	.73
Belts	.70	.79	.69	1.21	2.81	.87	1.50	2.22
Pulleys	.58	...	.30	.39	.06	.07	.06	.11
Worm gears	...	.04	.03	.03	.02	.01	.03	.01
Battery cons. & bolts	.18	.27	.07	.14	.12	.13	.10	.09
Motor bearings	.02	...	.04	.01	.01	.02	.03	.01
Dynamo bearings	...	.26	.32	.58	.51	.49	.86	.72
Lamp shades	.01	...	.05	.07	.10	.02	...	...
Battery separators	.90	1.01	.26	.43	.94	.28	.35	.49
Cost per car per month	42.50	48.41	27.97	24.25	51.43	38 22	44.52	50.86

Interest is allowed at 5 per cent. on the cost of the entire equipment and depreciation at 10 per cent. on the shipment, except batteries, nothing being allowed on the latter because they are renewed from time to time, as needed, with the latest type, the expenses being shown in the several items covering battery renewals. The cost of "power," includes only the cost of extra coal needed to operate the dynamo. This must necessarily be a rough estimate because of the lack of data regarding the actual amount of power consumed.

If the figures given in the table are brought together and averaged with reference to the cost per 1,000 car miles for the two years, we have

	1906.	1907.
Business	$4.26	$4.90
Coach, chair and combination	2.08	2.53
Dining	2.97	4.10
Pullman	2.78	3.23

If, now, we take the above averages per 1,000 car-miles and

the detail statement of the costs and pro rata both on the basis of the number of cars in service, against which the charges are made and the cost computed in the reports, we obtain results that are seemingly contradictory, though, in reality, they are not and will be found to be quite compatible with each other. On the basis of the cost per month as per the table, that cost fell from an average of $39.06 for all cars in 1906, to $38.91 in 1907. But on the basis of the average cost per 1,000 car-miles, the cost rose from $2.95 in 1904 to $3.17 in 1907. As the latter is the correct basis of estimate when considered from the standpoint of the cost to all of the railway interests involved, it is fair to take this as a demonstration of the probability that the expense of maintenance of this, as in all other classes of machinery, increases with the age and consequent physical deterioration of the machine.

The actual cost to the railway is somewhat modified, however, in the case of the Pullman cars by the charges made against that company. These charges are for rental and material which must be deducted from the costs given in the detail of the table. They were as follows per month:

	1906.	1907.
Rental	$8.61	$8.79
Material	2.51	4.01
Total	$11.12	$12.80

Subtracting these totals from those in the table we have $33.40 for the average cost of the Pullman cars per month to the railway in 1906 and $37.06 for the same in 1907. This gives a net cost per 1,000 Pullman car-miles of $2.07 in 1906 and $2.42 in 1907.

It is to be understood, as already stated, that these figures do not cover the cost of repairs of the lighting apparatus caused by damage done in wrecks.

Turning now to a resumé of the light and apparatus failures to which allusion has been made, the following tabulation of these results is presented:

Resumé of Failures of Light and Apparatus, Average Per Month, January to June, Inclusive.

	1906.	1907.
Regulator: Main fuse blown*	8.3	13.4
Motor	10.0	12.3
Ratchet	4.3	4.0
Carbons	....	1.8
Automatic switch	13.0	6.5
Total in regulator	39.3	49.0
Generator	9.5	39.8
Pole changer	2.5	3.5
Belts	21.3	37.5
Pulleys	3.0	4.0
Belt tension	1.3	2.5
Car wiring and fixtures	5.0	3.8
Batteries	0.7	1.7
Misc.: Cause not apparent or not reported.	0.5	4.5
Total failures of apparatus and light	83.1	148.5
Total cars in active service	90.5	101.0

*Cause not apparent or not reported.

This statement shows that the failures increased 78.7 per cent. in the year, while the number of cars in active service only increased 11.6 per cent. In other words, the average of monthly failures of light and apparatus per car in active service increased from 1906 to 1907. Whether this is due to decrease of efficiency due to natural wear and tear, or to a lowering of the efficiency of supervision is not stated in the reports or known.

The engineer in charge of lighting makes the following statement regarding light failures:

"It appears from this that the number of light failures doubled on business, chair and composite cars and coaches; that they were two and one-half times as great on diners and four times on Pullman cars, and that they averaged nearly three times as great on cars as compared with a corresponding period of the year before. The corresponding ratios for failures of apparatus, including those of light, are roughly as follows: 1, 2, 2, 1.35 and average 1.6 compared with the year before. This indicates that the batteries are in poorer condition and have less capacity than the year before and are, therefore, less able to carry the lights until the generating apparatus could be repaired. The increase is distributed as follows:

Dynamo	32 per cent.
Belts	15 "
Regulator	6 "
Miscellaneous	7 "

"The cost of maintaining the equipments on coaches, chair and composite cars is increased from the year before about 22.5 per cent. per active car month and 21.2 per cent. per car-mile.

"The expense for dining cars was increased 34.5 per cent. per active car-month, and 38 per cent. per car-mile.

"The increase in the Pullman cars was 14 per cent. per active car-month and 16 per cent. per car-mile.

"This increase was attributed to the general advance in wages, to the employment of inexperienced men, to replacing old equipments, to experimental work needed to adapt the apparatus to the service, to the multiplicity of types of apparatus in use, and to the development of unexpected defects in the apparatus.

"Some types of apparatus fail because of poor commutation and failure to pick up. Others are considered to be rather expensive to maintain, especially when overloaded, when they have been six or seven years in service; and this overload is becoming a common matter since the public demands at least 25 per cent. more lamp hours than it did three years ago.

"The utmost attention is being paid to these matters and it is expected that a good service at a low cost will be obtained at an early date. The tungsten lamp, now being developed, promises to reduce battery expense considerably and improve the light.

"In order to show the sensitiveness of this system, there was an increase of 21 per cent. in the failures of apparatus and 60 per cent. in light in the same month for two consecutive years, due to the increase in the trips made by a high-class train which gave less opportunity for the usual annual overhauling and increased the work of maintenance. Then five of the best men in the service left, as other roads installed many axle light equipments and were willing to pay higher wages to men experienced in this class of work, such men being few in number. Much time was expended by the old men breaking in new men." The result was that, at the time there was an entirely new force of men at one of the terminals.

The special trouble with this type of apparatus appears to be in the commutation, such as projecting ribs of mica and too much current in the field coils. It is considered, by those in charge, that it would be a good and almost unimprovable record when the failures amounted to but 2 per cent. of the cars per month. Such a condition can only be attained when the men are all familiar with the equipment, as when but one type was in use on the road. In short, one man attributed the excessive number of failures to the multiplicity of types and the lack of familiarity on the part of the working force with the same.

From the standpoint of the passenger, the arrangement of the lights in the car has much to do with his comfort. For example, in a car equipped with berth lights, and where the deck lights were out of order, and the former only were lighted, the effect was very unpleasant because of that long line of unshaded incandescent lights directly in the range of vision. The head of each passenger in the car was bent forward and the eyelids were drooped so as to protect the eye.

The same holds true, to an extent, when there is a long line of electric lights in clear glass on the deck sill and where they are not shaded sufficiently to protect them entirely, although the effect is not as disagreeable as in the case of the berth lights because the lights are higher and not in the direct line of vision.

This trouble with glare is being obviated by the use of a deep bell shield or globe that comes down covering the whole bulb of the lamp. With this arrangement there is no glare in the eyes and yet there is a direct unshaded light coming

down from above at every seat. The effect is all that could be desired; a brilliant light in all parts of the car and yet no glare in the eyes. The lamps are also set out on brackets so that they light not only the deck but the upper part of the ceiling, and the production of dark shadows in recesses is thus avoided.

It appears, then, from a consideration of the reports that are outlined above and the statements of the officers of the roads, that electric lighting by the use of an axle-driven dynamo is rather more expensive than either the acetylene or the Pintsch light to produce, while the cost of maintenance of the apparatus is not only higher under conditions of normal and favorable operation, but is sensitive to any change in those conditions and rises at once if there is any variation in the type of apparatus used, and has a constant tendency in the same direction as the apparatus ages and undergoes the natural deterioration of all machinery under the operation of legitimate wear and tear.

The axle light is necessarily supplemented with storage batteries, and the following list may be taken as a fair average of the equipment per car.

Sleeping cars	72 lamps each.
Chair cars	38 " "
Dining cars	56 " "
Day coaches	42 " "
Business cars	63 " "
Dining cars	10 candelabra each.

The generator commonly used has a capacity of 35 amperes, and the general illumination of cars is usually effected by means of 16-candle power lamps, while others of 8-candle power are used for the berth lights in the sleeping cars. The life of these lamps is about 800 hours, or 3½ months. They work on a voltage of 32, and it is estimated that the cars are in service, on an average, of about 8 hours per day. The ordinary day coaches are usually equipped with a storage battery of 16 cells, having a capacity of 240 ampere hours. But sleeping and dining cars should each be equipped with two sets of batteries of 16 cells each, whose combined capacity is 480 ampere hours.

The cost of this equipment may be placed at $650 for the generators and $470 for the storage batteries.

It is recognized, however, that the 35 ampere generators are of too low a capacity to meet the requirements of the service and the officials have no hesitation in saying that generators of 60 amperes should be installed for this work, for a generator rated at 35 amperes can really be depended upon only for an output of 28. The trouble arose from the anxiety of the contractors to install their apparatus, and to make the cost price as attractive as possible to the railway company, with the result that they let their desires run away with them, and, by overestimating the capacity that could be relied upon, and underestimating the work to be done, they have equipped cars with an apparatus too small for the work that it would be called upon to perform, so that the lamps are apt to burn red.

With this limitation regarding its lack of capacity, it may be said in a general way, that the axle light apparatus is satisfactory in that it works up to its capacity without difficulty. The trouble lies in the fact that it is usually of too low a capacity for the work that it has to do, so that, with the generator running at speed, its output is insufficient to maintain the lights, and there is a constant drain on the storage batteries. It is, therefore, necessary to charge the latter at terminals.

The charging plant for the storage batteries should be of ample capacity. Where it is too small, trains will inevitably be sent out with batteries partially charged. The result of this will be a rapid deterioration and an early wearing out of the batteries with the attendant high cost of renewals.

On one road having 163 cars equipped, the average monthly cost for labor and material for maintenance, was $12.71.

The coal consumption is estimated on 4½ lbs. per horse-power per hour, and the cost of this on the basis of eight hours per day is put at $1.50.

The estimated cost of charging the batteries is $4.10.

Interest and depreciation at 15 per cent. on $1,300 is $16.25 per month.

Hence the total cost per car per month is:

Labor and material	$12.71
Coal	9.60
Current for batteries	4.10
Interest and depreciation	16.25
Total	$42.66

The figures for cost of charging at the terminals is a personal estimate, as the railways have no figures for it.

Electric apparatus is always very sensitive, and it is small wonder that a generator beneath a car should develop a multiplicity of woes. The belt must be properly fastened or there will be frequent breakages, and it is necessary, of course, that the generators should be kept quite clean and this requires that the work should be done every four days. Then, there is a complaint that the machines are not properly standardized, nor the parts made with sufficient accuracy in the matter of dimensions and interchangeability. There is a tendency on the part of the generator, which is hung outside the axles, to cock the truck. The fact that the generator is not sufficient for its work, requires a charging of the batteries at terminals, and this they call "boosting" it along. More or less trouble is experienced with the batteries because of the breakage of the jars or cells, and it is essential that they should be inspected at least once a month and sometimes every trip for this breakage. A part of this is caused by the fact that the boxes are not made to fit properly, as they should be.

Although many of the generators have been taken down and sent back for repairs, there has been little trouble with the automatic switch by which the current to and from the batteries is controlled, other than burning out.

In the case of some of the parlor cars there are as many as fifty 12-candle power lights and the 28 ampere rating of the generator is insufficient, even though it runs, as it frequently does, with an output of 35 amperes.

This annoyance is complicated by the fact that it is difficult to locate any dynamo trouble, because the battery will not stand up to continuous running, and, if this is demanded, there will be a breakdown and failure.

Strange as it may seem, the greater portion of the trouble with this system is met on local runs; probably because of the repeated stops at short intervals and the constant wide variations in speed that occur. It thus appears that it is necessary to place the apparatus in the hands of very competent and experienced men, and it is the opinion of the officials in charge that the axle light offers no advantages whatever over the simple storage battery working alone that was first installed.

In one case there were about two light failures per car per month, and about 1,600 ampere hours of current has to be used for charging the batteries that are supposedly kept in working conditions by the axle-dynamo when the car is running in the daytime and with no lamps burning.

STORAGE BATTERIES.

For simplicity of plant, the storage battery probably takes the lead, as compared with any other system of electric car lighting. An ordinary equipment consists of three sets of cells, with 12 cells in each set and wired so as to be used as one, two or three sets at a time.

Each set should have a capacity to run ten lamps for 16 hours. This will allow for fitting each passenger car with forty-two 12-candle power lamps, with a voltage to be supplied of 32.

The charging is done at one or more terminals, and the batteries are removed from the cars for the purpose.

The life of the batteries has greatly increased since the early installations. When electric lighting was first used the life of the batteries averaged about 13 months, but now,

with the improved ones in use, this life is about 18 months.

As for the cost of equipping, one case of 41 cars will serve as an illustration. These cars had 1,070 lamps, and the cost of equipping was $7,970. To this must be added that for 194 sets of batteries, $36,357, and for the charging plant with battery trucks $11,131. Calculating the interest on plants and batteries at 6 per cent. per annum, and, taking 6 per cent. for depreciation on the plants only as a renewal of the batteries takes care of the depreciation, and then, adding the other expenses, we have:

Interest and depreciation	$372.79
Labor	643.18
Material	260.64
Fuel	108.00
Total, cost per month	$1,384.61

Combining this with the number of cars and the hours of lighting, we have:

Cost per car per month	$33.771
" " lamp " "	1.299
" " " " day	.043
" " " " hour	.005

These figures, of course, vary from month to month and between different plants on the same system.

PINTSCH LIGHT.

The use of the Pintsch system of compressed oil gas is undoubtedly more extensive than any other method of car lighting in this country.

In the case of an equipment, in one instance, of 21 cars the cost of installation is put at $8,379. In these cars there were 369 lamps. Taking depreciation and interest at 6 per cent. per annum each, the total charge for lighting was as follows:

Interest and depreciation	$1,005.48
Cost of gas	2,487.82
Material	84.45
Labor	164.55
Total cost per year	$3,742.30
Actual hours all cars lighted during year	34,895
Actual hours each car lighted per day	5.3
Cost per car per year	$207.91
" " " " month	17.33
" " " " day	.577
" " " " hour	.109
" " lamp per hour	.018

In this service each burner is rated at 6 candle-power or 24 candle-power per lamp. This is on the basis of an open flame lamp, which may be taken to give about 10 candle-power per foot of gas consumed per hour. But if the inverted mantle lamp is used the gas consumption will be cut down to one-third, or a yield of 30 candle-power per foot per hour. So that the figures given above would then become for the same amount of light:

Interest and depreciation	$1,005.48
Cost of gas	829.27
Material	84.45
Labor	164.55
Total cost per year	$2,083.75
Cost per car per year	$99.216
" " " " month	8.268
" " " " day	.277
" " " " hour	.052
" " lamp per hour	.009

In addition to the data thus obtained by personal inspection and interview there are a few points bearing on the subject, culled from outside authorities, that it seems worth while to present.

The data regarding the actual quantity of steam consumed by the various types of direct and axle-driven generators are rather meager. In a paper before the Western Society of Engineers in October, 1907, D. C. Jackson gives a diagram showing the consumption of various trains. In the case of the Northern Pacific he shows the decrease in consumption per kilowatt hour with the increase of load, but does not give that used on the train. This consumption varies, of course, with the steam pressure and with a Westinghouse engine is about 75 lbs. per kilowatt-hour, with an initial steam pressure of 83 lbs. per sq. in. In the case of the Pioneer Limited on the Chicago, Milwaukee & St. Paul, the weight of train not being given, he states that "the average steam pressure was 92 lbs.; the average load on the dynamo was 8.7 kilowatts, and the average steam consumption was 690 lbs. per hour. On another trip the average steam pressure was 108 lbs.; the average load of lamps was 8.9 k.w., and the average steam consumption was 780 lbs. per hour. Again with an average steam pressure of 90 lbs., the average load of lamps was 9.5 k.w., and the average steam consumption 770 lbs. per hour.

"A similar equipment of 17 k.w. capacity was tested on the Chicago & North Western Railway. In this instance, the time of the test occupied 5.75 hours. The average load was 8.2 k.w. and the average steam pressure 86 lbs.; the average steam consumed was 870 lbs. per hour."

The same author, in discussing the Consolidated axle equipment, says that in one case: "The total generator output during a period of 31 hours was 28.6 k.w. hours, the lamp consumption was 14.6 k.w. hours, the battery charge was 12.2 k.w. hours, and the battery discharge was 4.7 k.w. hours. The average generator efficiency was 80 per cent., and, assuming 3 per cent. loss in the belt, the average horse-power absorbed from the axle is 2.1 horse-power. The total efficiency for the run computed by taking the ratio of the lamp consumption in kilowatt hours to mechanical power put into the generator is slightly under 40 per cent."

In the case of a test of the Bliss equipment; "the total duration of the test was 74 hours, during which the generator operated 49.5 hours, and the train was below the critical speed and the generator was not operating 24.5 hours; the total generator output was 57.9 kilowatt hours, the lamp consumption was 28.4 kilowatt hours, the battery charge was 8.5 kilowatt hours and the battery discharge was 7.3 kilowatt hours. In this instance the battery charge perhaps does not have sufficient margin over the battery discharge and a correction of this condition should perhaps be made. The average efficiency for the trip was about 30 per cent."

In this work an assumption is made as to the loss due to belt slip, which under the conditions of operation, may be very far from even an approximation; and, in the case where the generator is being run at below the critical speed it is evident that a correct estimate of the loss of power is an impossibility. Consequently, any data regarding the actual amount of power delivered to an axle generator must be received with a wide margin for inaccuracies, until some test has been made by which this power is accurately and definitely measured.

In summing up his results Mr. Jackson says that on trains like the "Pioneer Limited" and the "Overland Limited," etc., the steam consumption while the electric light plant is in operation, with the steam-driven sets, is from 700 to 900 lbs. of steam per hour for eight-car trains. This makes a steam consumption of approximately 100 lbs. per hour per car on the train. The electric light engine operates from eight to ten hours a day, and it may be taken as an average figure that about 900 lbs. of steam are consumed per car per day.

"In the cars with the axle-driven sets the average power absorbed from the axle throughout the run may be set down as between 2 and 3½ horse-power per car, depending upon the character of the car and the system considered. For the extended lines overland this continues for 24 hours out of every day, and consequently from 48 to 60 horse-power hours are absorbed from the axle. Assuming that the locomotive can develop each horse-power with 30 lbs. of steam per hour, the consumption of steam by the axle-driven set amounts to between 1,500 and 1,800 lbs. of steam per 24-hour day, which is from 50 to 100 per cent. larger than the amount of steam used by the baggage per set. This is offset by the fact that the operation of the set is rendered automatic and requires inspection and testing only at the ends of the trip instead of requiring this attention continuously during the run, and that the consumption of steam per hour is only 0.65 to 0.75 as great as with the engine-driven sets.

"When the run comprises only the time of a single night, or less, instead of extending over 24 hours, the advantage turns distinctly towards the axle-driven equipment.

"One of the features that militates against the best success of certain of the axle-driven sets lies in the fact that the manufacturers have not learned to install their apparatus in the best possible manner and are willing to undertake the operation of sets in connection with cars which are poorly wired."

In reviewing the data obtained it is found that the cost of furnishing 400 candle-power for a period of six hours, with the several systems of lighting investigated, is as follows:

Pintsch gas (open-flame burner)	$0.369
Pintsch gas (mantle lamp)	.123
Axle light (electric)	1.422
Storage battery	1.322
Dynamo in baggage car	1.462

Taking the Pintsch mantle light as the base the above figures give the following ratios of costs:

Pintsch mantle	$1.000
Pintsch gas (open-flame burner)	2.096
Storage battery	7.511
Axle light	8.079
Dynamo in baggage car	8.304

The investigations relating to the acetylene systems show that their costs fall between the Pintsch gas and the electric systems.

THE USE OF ALTERNATING CURRENTS IN RAILWAY SIGNALING.*

The use of alternating currents in railway signaling came into prominence when it became necessary to use track circuits in connection with automatic block signaling on electric roads.

The fact that the rails on an electric road are used to carry back to the power house the relatively enormous currents taken by the train, made the ordinary steam road track circuit with its feeble current and delicate relay totally untrustworthy because of the fact that the relay would be falsely operated by the traction currents. It therefore became necessary to employ a relay immune to the influence of the traction currents and in turn to provide a current capable of operating it. Alternating current possessing the required characteristics was selected as the signaling current and relays, etc., were designed which could be operated by it and which, at the same time, would be immune to the traction current. This was done, with the result that alternating current has become the standard power for track circuit purposes on electrified roads, whether the propulsion current be direct or alternating in character. If direct, the signaling current may be of any commercial frequency. If alternating, the signaling current must have a frequency distinctively different from that of the propulsion current.

In addition to its use on electric lines as above described, alternating current has also been employed, and in fact is now being seriously considered, for more extensive use on steam roads for track circuit purposes where foreign currents are prevalent. * * * Alternating currents may also be employed for the operation of signal motors, slots, lights, line relays, indicators, locks, etc., and for charging batteries.

I do not know that I am prepared to recommend the installation of an alternating current system primarily for the operation of the aforesaid devices unless it can be shown to be in the interests of safety, reliability and economy of operation, but what I do recommend is that if of necessity an alternating current system must be installed on account of propulsion or foreign currents on the rails, then the same power should also be used for all the devices rather than run one or two more kinds of power the length of the line.

The first all alternating current central energy system of this kind was installed on the electric zone of the New York Central, and since then other systems have been installed. To-day A. C. systems and devices are available which will operate with a greater degree of precision than do those operated by direct current. For example, in the Hudson tunnels recent reports show but one automatic signal failure to over 726,000 operations and on the all electric interlocking plants, which are governed by a.c. track circuits, relays, etc., only one failure in four months during which time there were over 337,000 operations.

As compared with direct current there are certain added advantages poossessed by alternating currents as follows:

(*a*) Its use for track circuit purposes prevents interference from other currents which may be carried by rails.

(*b*) It obviates the use of all batteries.

(*c*) It is extremely flexible, i.e., from a transmission line

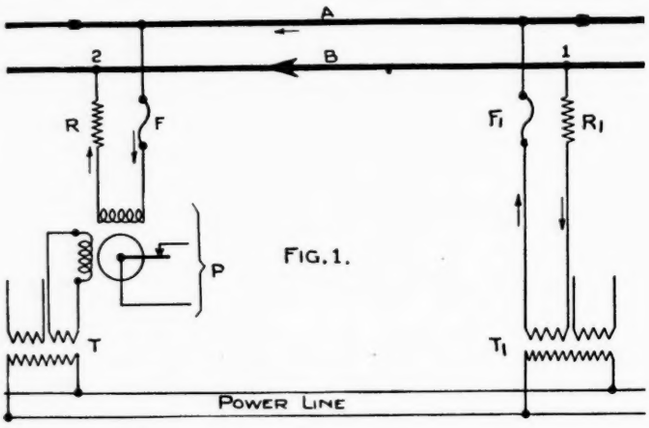


FIG. 1.

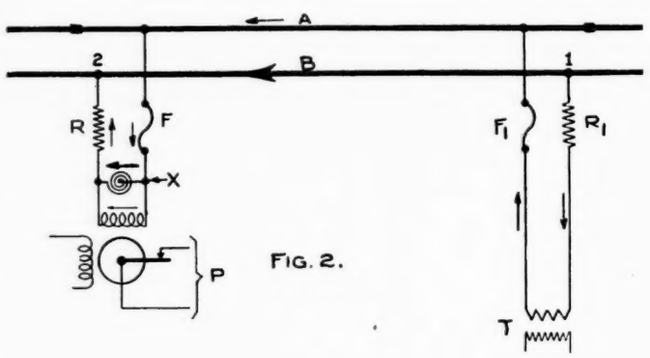


FIG. 2.

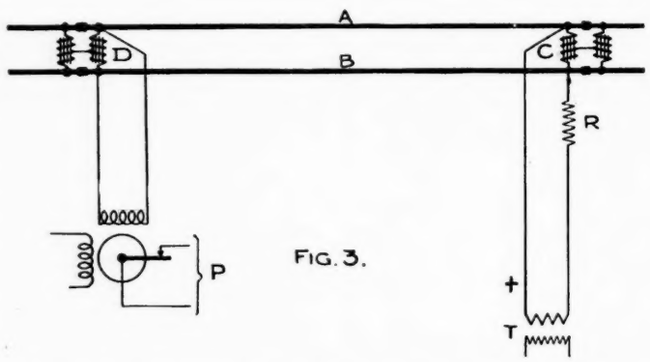


FIG. 3.

of given voltage any other voltage or any amount of current desired may by taken by the use of static transformers which merely consist of some coils of wire, suitably insulated and placed on an iron core, the whole thing enclosed in an iron core and mounted upon a pole.

(*d*) It can be transmitted at a high voltage and small current, thus enabling comparatively large amounts of power to be transmitted great distances with minimum loss.

(*e*) The high voltages necessary for transmission are kept up on the pole line and are effectively shielded from all working circuits.

(*f*) More things can be done over a single wire than with direct current.

*A paper by W. K. Howe, Chief Engineer of the General Railway Signal Co., read before the Railway Signal Association at New York, June 8.

Alternating currents for signal purposes have, however, certain disadvantages as compared with direct current, as follows:

(*a*) Alternating current devices consume more energy. This, however, is more than offset by the efficiency of transmission.

(*b*) Alternating devices are somewhat more costly, but this is largely compensated for by the reduced number of devices required. For example—few if any, cut sections are required in track circuits.

(*c*) Alternating current cannot be directly stored as can be done with direct current in connection with storage batteries.

(*d*) For its generation rotary apparatus must be kept in continuous motion. This is not a serious matter if, as is frequently true, a source of supply exists for other purposes—nor is it a very serious matter in any case with the present state of development of dynamo electric machinery with their ball bearings, self-lubricating carbon brushes, perfect commutation, insulation, etc. In fact, rotary apparatus has been known to run for years with practically no attention. To insure a continuous supply of current in case the primary source should fail temporarily, it is entirely practical to so intercornect a storage battery with the system that the supply of alternating current will continue during such interval.

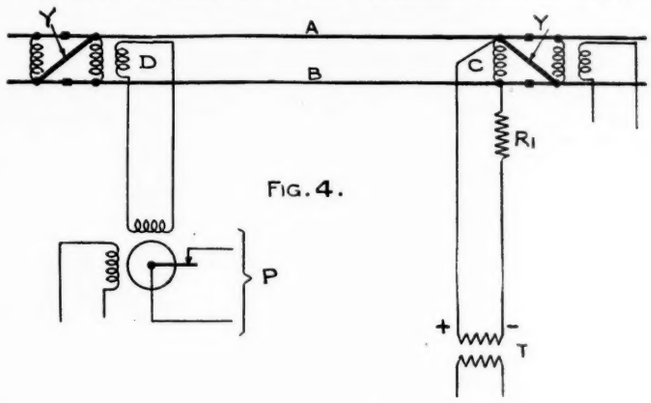


FIG. 4.

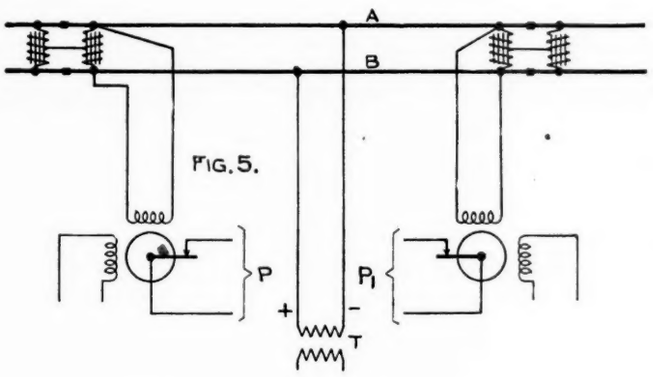


FIG. 5.

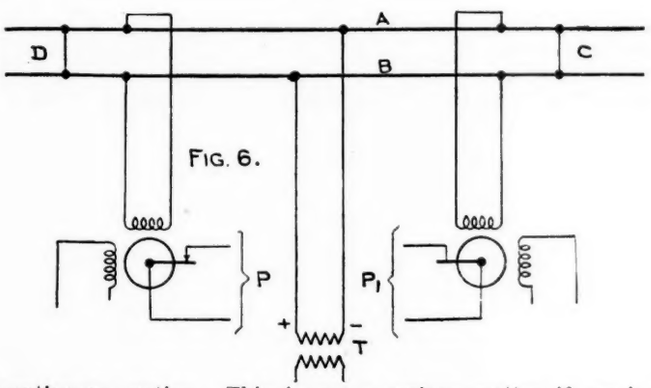


FIG. 6.

(*e*) Owing to the fact that alternating current cannot be commercially stored, as in the case of a direct current storage battery, and that therefore all power must come from the various sub-stations, an alternating current system becomes entirely dependent on the integrity of the transmission line, and this, above all other things, is the great barrier to its more extensive use on steam roads, except where imperative on account of foreign currents. I say barrier, not because it is impossible to provide a reliable transmission line, nor because of any serious trouble which has been experienced where lines are put up in a substantial manner suitably protected from lightning and where the sub-stations are so located that if the line breaks energy can be fed up to the break on either side, but because of the *expense* of such a line, especially where there is no existing pole on which it may be placed. As a general rule, the voltage necessary for the economical transmission of power is too high to permit placing the power lines on existing telegraph pole lines unless lead covered or armored cable is used with the sheath grounded at suitable intervals. This, however, is very expensive, although good construction.

Neither is it usual to find a high tension transmission line along steam roads that is available for stringing the power wires, so recourse must be had either to a separate pole line or to placing the wires underground.

A separate pole line with bare wires is the least expensive but is subject to the elements, although, as formerly stated, this has not proved a very serious matter, for the reasons given above and also because of the fact that the wire used for transmission purposes would be of much greater tensile strength than the telegraph wires. Furthermore the poles would be relative short and would not be overloaded with a large number of wires.

Placing the wires under ground is undoubtedly the most reliable of all methods, provided they are suitably insulated and protected from mechanical injury and electrolysis, but this is also a very expensive proposition.

It is, of course, true that dispensing with all batteries, with oil lamps and with practically all cut sections, with the labor and material incidental thereto, makes an important offset to the expense of a reliable power supply and transmission system; yet even taking these things into consideration, it is doubtful if such a system could be justified from a commercial standpoint, except where imperative on account of safety or where the signaling is reasonably dense, and in any event it is a case of balancing interest charges against operating expenses.

If pole lines exist on which the transmission lines can be placed, or if the power can be taken from some existing source, or if the generating apparatus can be installed where little, if any, extra expenses for attendance will be incurred, or if other uses can be found for the current in addition to that for automatic signaling purposes, such, for example, as charging interlocking storage batteries, lighting towers, stations, etc., then its use is more likely to be justified.

The above general statements may appeal to you as in a measure unsatisfactory and I grant you that they are, for a man who wants to know what he shall do in respect thereto, but my experience has shown that almost every proposition is different from every other and that no fixed rule can be laid down.

I now invite your attention to Figs. 1-12 illustrating the use of the alternating current track circuit as applied to electric traction roads. From all except Fig. 1 I have omitted the power line for the sake of simplicity. Furthermore, I have shown the same relay throughout, except in Fig. 8, although there are other relays on the market which could be used.

Alternating current track circuits for use on electric lines are divided into two general classes, viz., "One Rail" and "Two Rail."

One rail track circuits are those in which but one rail is retained for the propulsion current, the other being given up for signaling as shown by Figures 1 and 2.

Two rail track circuits are those in which both rails are retained for the propulsion current, and are also used for signaling as shown by Figures 3 to 8 inclusive.

One rail track circuits are permissible where one rail per track is sufficient for the propulsion current and where broken rail protection is not required. On account of their comparative simplicity they are desirable for use in yards or other complicated situations where the use of the reactance bonds required in connection with two rail track circuits may be undesirable.

One of the chief electrical differences between one rail and two-rail track circuits is that in the former a difference of potential is created between the rails by the propulsion current in direct proportion to the length of the track circuit, the resistance of the rail and the amount of propulsion current flowing in the continuous rail. This limits the commercial length of one rail track circuits; whereas in two rail track circuits no inter rail potential exists, for each rail carries approximately 50 per cent. of the current.

Two types of one rail track circuits are illustrated. They differ in the means employed to limit the amount or effect of such direct current as may be shunted through the relay and transformer when traction current flows in the continuous rail thereby producing inter rail potential.

Referring to Fig. 1, for example, if propulsion current flows down rail B, as shown by the heavy arrow, a certain portion of it will be shunted through the transformer, rail A and the relay as shown by the light arrows, due to the resistance of rail B. The amount of such shunted current depends on the length of track circuits, the size of the rail, the amount of propulsion current per rail and the resistance of the path through relay and transformer from point 1 to point 2. The greatest amount will flow through the relay if the rear wheels of a car are standing so as to short circuit the transformer while propulsion current is flowing in rail B. Likewise the greatest amount will flow through the transformer if the wheels of a car are standing so as to short circuit the relay while propulsion current is flowing in rail B.

In the circuit (Fig. 1) the amount of this shunted current is limited solely by the resistance R and R 1, whereas in the circuit in Fig. 2 it is limited, at the relay end, partly by the resistance R and partly by the reactance coil X, which is in shunt with relay and has a high resistance to alternating current and a very low resistance to direct currents. The shunted current at the transformer end is limited solely by the resistance R 1, but the effect of such current on the transformer is limited by the design of the transformer, i.e., the transformer may have an air gap in the magnetic circuit which prevents the shunted direct current from magnetizing it too highly and thus causing heavy currents to flow in the primary with a resultant drop in voltage at the track.

Referring again to Fig. 1. If resistance R and R1 should be made too great, the track circuit would require too high a voltage (a.c.) between rails and would make the circuit supersensitive to leakage variations between rails. Therefore this type of track circuit is limited to cases where the drop in the propulsion rail (B) does not exceed 15 volts between points 1 and 2. This corresponds to a current of approximately 1,500 amperes flowing in 1,000 ft. of 80-lb. rail of ordinary resistance.

The circuit, Fig. 2, can stand a very much greater drop in the propulsion rail without a corresponding increase in the resistance of R and R 1, by reason of the construction of the transformer and the use of reactance coil X which permits the flow of a much greater shunted current without affecting either the relay or the transformer. This being the case, the circuit is usable on longer track circuits and with heavier propulsion currents than the Fig. 1 circuit.

The circuit in Fig. 1 has the advantage that it consumes a smaller amount of energy and, because of the high resistances (R and R 1) employed and the small amount of current permitted to flow in the relay and transformer, these devices may be placed a relatively long distance from the track circuit without excessive wire cost. In fact all relays at an ordinary interlocking plant can be placed in the tower, a single transformer in the tower being used to feed all track circuits. This is of especial advantage where it becomes necessary to repeat all track circuits into the tower as it does not cost as much as to repeat by means of secondary relays and is much safer. In this connection may be mentioned another advantage of the circuit in Fig. 1, viz.—the resistance units R and R 1 are relatively small, as indicated by the fact that all of the fuses and resistances for an entire interlocking plant may be placed on a single slate panel in the tower.

This scheme of using one large transformer in the tower and of centralizing all track relays is in use at several interlocking towers with excellent results.

Summarizing the discussion of single rail track circuits:

(*a*) Single rail track circuits are permissible where one rail per track is sufficient for the propulsion current and where broken rail protection is not required. As to whether one rail per track is sufficient should be decided upon jointly by the signal and power departments of the railway in consultation with the Signal Company. On the one hand, if there is not enough return conductivity in the rails, the lights in the train will vary excessively in brilliancy when the train is started and stopped. Furthermore, the trains will run slower than otherwise and the fuel consumption will be excessive. On the other hand, if both rails are retained it will cost much more for signal appliances and signal power, and the complications will be greater, especially through interlockings.

In general, it may be stated that single rail track circuits find their greatest usefulness in terminal work and for slow speed routes, through interlocking plants on account of their low cost, small power consumption, comparative simplicity and adaptability to fouling protection and complicated track circuit layouts through switches.

(*b*) Track circuits of the type shown by Fig. 1 are usable wherever the drop in the traction rail between the points 1 and 2 does not exceed approximately 15 volts. As a matter of fact, it will be found that in the great majority of cases where it is safe to use single rail track circuits at all the Fig. 1 type can be employed.

(*c*) Single rail track circuits of the type shown in Fig. 2 should be used where permissible and where the voltage drop in the traction rail exceeds 15 volts.

(*d*) The continuous rails of each track may be cross bonded as often as desired.

Coming now to a consideration of two rail track circuits, your attention is directed to Figures 3 to 8 inclusive.

Two rail track circuits are used wherever it is necessary to retain both rails for the return of the propulsion current to the power house, as explained in concluding paragraph (a) of the discussion of single rail circuits.

The two-rail track circuits in commercial use are of two general types, viz.—those employing balanced reactance bonds with iron cores, Figs. 3, 5 and 8, and those employing reactance bonds without iron cores, Fig. 4. For brevity they will be spoken of as iron and ironless bonds respectively. Two-rail track circuits are again divided into "center fed" (Figures 5 and 8) and "end fed" (Figures 3 and 4).

The function of a reactance bond is to keep the rails electrically continuous for the propulsion currents and at the same time electrically separated, so to speak, for the signaling current. They are "bonds" because they contain copper conductors by which the ends of the rails are joined together, and "reactance" bonds because they offer a comparatively high resistance to the passage of alternating currents sent through them from rail to rail.

The iron core bonds usually consist of eight turns of copper

conductor of very large carrying capacity placed around but insulated from an iron core, the whole being placed in an iron box and the coils being connected to the rails as shown at C and D, Fig. 3, for example. Center taps are provided on each bond by means of which the various track circuits are connected together so as to form a continuous path of low resistance for the propulsion currents.

It is to be noted that the propulsion current flowing down the two rails passes through the two halves of each bond in opposite directions with the result that it has no magnetic effect on the bond unless more current flows in one rail than the other, in which case it would have a magnetizing tendency, which if too great, would lower the reactance of the bond, changing its resistance to alternating currents and lowering the relay voltage. As this difference of current in the rails, called unbalancing, is likely to occur, the bonds are designed with an air gap in the magnetic circuit which makes them much less sensitive to unbalancing. It is good practice to design the bonds to take care of an unbalancing of 20 per cent. without causing a harmful variation in the reactance. By 20 per cent. is meant that the difference of the currents in the rails shall not exceed 20 per cent. of their sum.

As regards sizes, bonds such as are used on the New York Central are wound with 1,250,000 circular mil copper bars, having a resistance of about .00014 ohms per pair to the traction current, a continuous current capacity of about 4,000 amperes per track, an unbalancing capacity of 1,000 amperes and weigh about 1,500 lbs. per pair in their iron case when filled with oil.

Those used in the Hudson tunnels are wound with 750,000 circular mil copper, hoving a resistance of about .00073 ohms per pair to the traction current, have a continuous current capacity of about 1,300 amperes per track, an unbalancing capacity of 500 amperes and weigh about 950 lbs. per pair in their iron cases when filled with oil.

(To be continued.)

AUTOMATIC SIGNAL RECORDS ON THE BALTIMORE & OHIO.

Mr. Patenall, Signal Engineer of the Baltimore & Ohio, has made up some data from the records of the operation of the automatic signals on the Washington branch of that road from which we make the extracts given below. These signals have the "top post" mechanism of the General Electric Company, and the lights (electric) show only when a train is approaching, the circuits to the lamps being closed by the approaching train in the same way that it closes the signal circuit, the signals being "normal danger." Thus, at night, a passenger in the observation car of a train experiences the novel sensation of riding over a block signaled road, while yet he never sees a signal.

The total cost of the installation was $2,014 per mile of double track, or per signal $765.95, divided as follows:

Labor per signal	$174.58
Materials per signal	591.37

The percentages of costs were as follows:

	Per cent. of toral.
Materials:	
Ground wire and line work	24.89
Track bonding	2.05
Battery wells and foundations	4.09
Weber joints and insulating materials	3.15
Tools	.85
Supplies	.28
Battery material	4.21
Battery wall framing and trunking	2.45
Storehouse sundry materials	.37
Signals, posts, mechanisms, relays	21.18
Paint	.12
Tower indicator and approaches	.57
Switch indicators	2.04
Relay posts and boxes	7.21
Materials used at interlocking plants	1.83
Switch instruments	1.92
Total materials	77.21
Labor	22.79
	100.00

The signals in the section referred to (27 miles of double track) were completed in 1907, and have now been in operation 12 months. The territory is divided into three districts, each having one repairman and one batteryman in charge of the maintenance of signals and renewals of battery.

In addition to the sixty-nine (69) automatic signals, one 16-lever interlocking machine and 12 crossing warning bells are maintained.

Cost of Operation and Maintenance.

Repair, labor—12 months	$2,700.00	
Supervision	135.00	
	$2,835.00	
Deduct cost labor devoted to interlocking and crossing bells	212.00	
		$2,623.00
Battery labor—12 months	$1,980.00	
Supervision	65.00	
	$2,045.00	
Deduct cost of labor devoted to crossing bells	48.00	
		$1,997.00
Total cost labor and supervision, maint. and operation		$4,620.00
Materials for track, relay and signal maintenance	$229.73	
Materials used for mechanisms—maintenance	4.68	
		$234.41
Battery material used	$1,972.12	
Less credit from scrap copper and zincs	$450.00	
Less battery material used for crossing bells	60.00	
	$514.00	
		$1,458.12
Total cost: Maint. and operation, materials and labor		$6,312.53

Number of signals maintained	69
Cost per mile, per annum, double track, operation & maintenance	$233.79
" " signal, per annum, operation and maintenance	91.48
" " " " month, operation and maintenance	7.62
" " " " day, operation and maintenance	.25
" " " " day, all battery material	.058
" of repair materials, 69 motor mechanisms, year 1908	4.68

These signals being three position, the cost of maintenance and operation for comparison with the home and distant system should be divided by 2, which will give the equivalent cost, per indication, viz.: $3.81 per month.

Record of Performance.

Number of perfect signal movements	1,895,921
Signal mechanism failures	3
Failures—all causes	96
Failures, per signal, per annum	1.4
Movements per failure	19,749
Percentage of efficiency	99.97
Percentage of failure	.03

Battery consumption has been very economical. The operation of the motor mechanisms and the lighting of the lamps primarily depends on the gravity charging cells, and the cost given, covering battery material used, also includes that of the renewals for track and line circuit battery, which are of the same type (gravity). The lamps, as before stated, are lighted and extinguished automatically during the approach and recedence of each train, and this is done both day and night. Each lamp is lighted when needed. If no trains are run, no lights are required; hence the economy in the system. The performance of the lamps has been of high efficiency. The lights never blow out during high winds; lenses never become smoked; lights do not flicker; wicks do not become charred; the intensity of the light never varies; lampmen are not necessary. During the 12 months' service of these 69 lamps, eight failures have occurred (lights out), or, a percentage of efficiency of 99.99. As noted, 14-volt lamps are used, the voltage of the storage battery being slightly less than 14 volts, thus resulting in increasing the life of the bulbs. A double filament bulb is used, which, when one side is burnt out (as is found by systematic inspection), a new bulb is substituted.

The materials for this signal installation were bought from the various signal companies, as follows:

Signal mechanisms, M-110, top post lower quadrant—General Electric Company.
Relays—General Electric Company.
Switch instruments—Union Switch & Signal Company.
Switch indicators—Hall Signal Company.
Signal posts—Union Switch & Signal Company.
Underground wire—Okonite.
Lamps—Dressel No. 8 with electric tops.
Roundels, R. S. A., standard values—Corning Company.
Insulated joints—Weber, 4-hole, 100-lb., A. S. C. E.

The battery wells and signal foundations are of concrete. These wells are slightly more expensive than made-up wells,

but the advantage in room provided amply repays the additional outlay.

In the signals the center of shaft is 31 ft. 6 in. above the top of the rail, at which height difficulties in sight which arise from the use of shorter masts are often overcome, the arm being visible in most cases above the lines of telegraph pole cross-arms. The top post mechanism has been criticized because of the greater liability to trouble due to careless inspection, but this difficulty has never developed here. Relay boxes and posts are made of wood, it having been demonstrated that there is less trouble from moisture precipitation where such mechanisms are housed in wood, as compared with iron.

Two types of battery are employed in the operation of these signals—

a. Electric Storage Chloride Accumulator, Type D-5, 40 Ampere hour.
b. Gravity Battery.

The storage battery is arranged in groups of six for each pair of signals, and it is charged by the gravity battery in a ratio of 3 to 1, or, 18 cells of the latter, and, in addition to providing power to operate the motors, the power for lighting the lamps is also drawn from this same source. Gravity battery is also used for the track and line circuits. There are in operation 251 cells of storage battery and 1,687 cells of gravity battery.

The signal lamps are of the railroad company's standard, fitted with electric tops, 2 c. p., 14 volt bulbs, and, prismatic reflectors.

This installation requires the use of five (5) line wires for double track:

a. Distant Wires, two, one for each track.
b. Clearing and switch indicator wires, two, one for each track.
c. Common Wire for both tracks.

Four of these wires are No. 8 iron, the fifth (common) wire being No. 10 B & S copper hard drawn and all weather-proof, double-braided. The ground wires are No. 9 seven-strand for battery chutes, No. 9 single-strand for track connections, and No. 14 for the signal circuits, all B & S gage, soft drawn copper, single-braid rubber-covered.

Hand-operated facing switches are equipped with two switch instruments, one being connected with the lock lever, the other direct to the switch points.

The normal danger plan of operating and lighting is covered by patent specification No. 851,692 issued to Patenall & Dryden, April 30, 1907.

During the year 1907, very little trouble was experienced from lightning. Each relay box is equipped with Argus lightning arrestors, and all relays are wound with enameled wire. Proper grounds are provided in the shape of ¾-in. iron rods, riveted to 24-in. iron plates, placed 5 ft. in the ground at each signal.

In 1908, a twenty-five (25) mile section of double track between Washington, D. C., and Germantown, Md., was equipped with upper quadrant automatic signals, three-position, G. E. type M-110-3, using the same methods in operating and lighting.

HUGH M. WILSON.

Hugh M. Wilson, formerly president of the Wilson Company, publisher of *The Railway Age* and the *Electric Railway Review* until June 1, 1908, was on July 3 elected a director and a vice-president of the Barney & Smith Car Co., Dayton O., effective August 1, 1909. Mr. Wilson was born on June 29, 1866, at Jacksonville, Illinois. His mother's maiden name was Isabella Smith, and his father's name, Hugh Wilson. Both his parents were born in Scotland. He received his education in the public and high schools of Jacksonville and in Illinois College, from which he graduated in 1887 with the degree B.S. He was very active in the student life of his college; was associate editor and business manager of the college paper, and was orator of his class. He is a trustee of his alma mater, and in 1904, on the occasion of the celebration of its 75th anniversary, it conferred on him the degree of Master of Arts. His father was an architect and a contractor and builder and ran a sash, door and blind factory, and the son got his early business training and experience by doing various kinds of work about the factory, including the keeping of the books, and also by intermittently attending a business college during vacations, etc. He spent a year in his father's business between his sophomore and junior years in college. He had intended to study law, but very soon after his graduation from Illinois College, his father's business was destroyed by fire and it was necessary for him to go to work; and he at once got the position of city editor of the *Jacksonville Daily Journal*. In March, 1888, he went to Minneapolis, Minn., and became a reporter on the Minneapolis *Evening Star*. A year later he became associated with the *Mississippi Valley Lumberman* at Minneapolis. He was married on October 9, 1890, to Olive Mary Williams, of Red Wing, Minn. In May, 1891, he went with the *North Western Railroader* at Minneapolis as associate editor. It will be noted that throughout Mr. Wilson's career up to this time he had divided his energies between editorial and business work. Even in his college days he was both associate editor and business manager of the college paper. The tendency he early manifested to gravitate from editorial to business life has continued up to the present. Within two weeks after he went to the *Northwestern Railroader* as associate editor, he was in the business department straightening out the company's books. Although he spent a good many years in successful editorial work he has always been more of a business man than an editor. He attended the conventions of the Master Car Builders' and Master Mechanics' Associations for the first time at Cape May, N. J., in June, 1891. He moved to Chicago on September 15, 1891, when the *Northwestern Railroader* was consolidated with the *Railway Age*. He started with the consolidated company as secretary-treasurer. He handled the office work of the business department and also a good deal of the news of the paper, especially that relating to the purchase of equipment and supplies. He subsequently became manager and associate editor, still retaining the title and duties of secretary-treasurer. He was elected president of *The Railway Age* in 1899. *The Railway Age* published a Daily at the International Railway Congress in Washington in 1905, which was the official journal of the congress. For the successful issuance of this journal Mr. Wilson was decorated a Chevalier of the Order of Leopold, by the King of the Belgians. In May, 1906, the Wilson Company was organized, with Mr. Wilson as president. This company continued to publish *The Railway Age*, and also bought the *Electric Railway Review*, which it changed from a monthly to a weekly. Mr. Wilson's active and energetic work for years in behalf of the railway supply interests is well known. He was secretary of the Railway Supply Manufacturers' Association from 1893 to 1897 inclusive. An account of the splendid tribute paid to him by his supply and railway friends at a dinner at Atlantic City on June 19, was published in the Daily Railroad Age Gazette, June 22. Mr. Wilson is a member of the following clubs at Chicago: The Union League Club, the Chicago Athletic Club, the Chicago Engineers' Club, the City Club, the Caxton Club, the Glen View Country Club and the Western Railway Club. Aftering entering on the duties of his new position he will make his home at Dayton, Ohio.

The government of the Province of Buenos Ayres in the Argentine Republic has contracted a loan of £2,400,000 ($12,000,000), the money to be devoted to railway construction.

ENGLISH ELECTRIC RAILWAYS.

While there is a lull—electrical engineers trust that it is but temporary—in electric railway traction in England, advantage may be taken of the absence of new development to outline briefly what has been accomplished up to the present.

There are altogether 16 railways operating electrically, including the London, Brighton & South Coast single-phase section from Victoria to London Bridge. As the finishing touches are being put to things here, and as there are no other electric railways being built or equipped at the present time, it is clear that the description that has many times of late been applied to the prevailing state of things—stagnation in electric traction—is not wide of the mark. Indeed when one remembers in connection with it that electric tramway work has also fallen away to a remarkable extent, leaving manufacturers wringing their hands in despair because the orders for which they had laid themselves out do not come along, the description has to be accepted as a perfectly correct one. The reports of rolling stock builders and of electrical manufacturers and contractors bear evidence of the disappointed hopes that all are sharing.

Of the 15 well established electric systems to which we shall refer, seven comprise the London tube lines, concerning which little need be said at this juncture as the principal interest that attaches to them relates to their efforts to work out their financial salvation against all manner of odds. The systems known as the Yerkes group, over which Sir George Gibb is the presiding genius, will require a little time in which to turn themselves round under the financial reorganization scheme which was adopted a short time ago, but given reasonable development of London traffic and a satisfactory carrying out of the mutual understanding restricting ruinous competition in fares there is considerable promise of improvement. Enterprising schemes are being carried out for advertising the excellent facilities that are now available, for this is a point concerning which the public requires a good deal of educating. One of the details of the advertising scheme that is now being carried out consists of placing illuminated electric signs and route maps with the words "Underground" in bold lettering at a large number of station entrances. The Franco-British exhibition at Shepherd's Bush led to very large business on the Central London tube, and this can be regarded not only as producing immediate additional receipts, but also as having very usefully contributed toward getting the people of London into the tube travel habit.

Before proceeding to particularize other lines it may be useful briefly to summarize the tube systems.

City and South London.—This title is not now comprehensive enough for the line to-day serves also northwards from the city on to Islington and Euston and King's Cross. On the south side of the Thames it extends as far as Clapham Common. From end to end it is 7.33 route miles (twin tunnels). It was the first tube line, and has been running for 18 years, producing a very poor return indeed to the investor. It has not hesitated to advertise its freedom from serious accident, but it seems now to be suffering from uncleanness, according to a Board of Trade report on a recent fire in the tunnel—perhaps this is one of the disadvantages of age. The fire in question occurred near Moorgate Street station, by no means the oldest part of the line. Mr. McMahon, the electrical engineer, stated that electrical leakage had been known to occur between the power and running rails owing to iron or carbon dust accumulating on sleepers and insulators, and this leakage had set fire to the dust and sleepers. Col. Yorke and A. P. Trotter, the board's electrical adviser, add that perhaps sparks from the locomotive shoes ignited the dust. They point out that although men clear away rubbish nightly, the tunnels are very dirty, and some of the dust is of a dangerous kind, while at points there is a good deal of oil-dripping. The coating of dust becoming ignited by a spark might be fanned by a passing train. Indeed the case under notice would have been far less important than it was had the passing of trains been stopped while the first attempts were being made to extinguish the flames. It is admitted that pieces of waste have been found on fire in the tunnels. There is a bucket of sand on each locomotive, and also a tank of water with compressed air tank for throwing a jet when needed. But the reporters in their statement make a number of recommendations, including the following: Greater cleanliness required, dust being more carefully removed; whitewash liberally used would detect any dust accumulation; no electric wires below or between sleepers, but to be neatly arranged along the tunnel sides, and all crossing of cables to be overhead; planking and wooden platforms to give way to slate or granolithic slabs; all traffic to be stopped until fire is out.

The gage of track on this railway is 4 ft. 8½ in., with 40-lb. conductor rail laid between running rails (60 lbs. and 80 lbs.). The line pressure is 500 volts (direct current). There are 52 locomotives and 165 coaches.

The Central London has been operating between Shepherd's Bush and the Bank (City) since 1900, over 6.5 route miles (twin tunnels). It has a 4-ft. 8½-in. gage track and started with heavy locomotives, which after a time had to be abandoned in favor of multiple unit control. Each train consists of seven cars and a 2½-minute service is run; 64 motor cars and 170 trailers; line pressure 500 volts direct-current, converted from a three-phase station current at 5,000 volts.

The Waterloo & City now has no separate existence as a company, being reckoned as part of the L. & S. W., but its twin tunnels with a track mileage of just over three miles serve from the Waterloo side under the Thames to the City without any intermediate station. Four-ft. 8½-in. gage track with 87-lb. running rails and a 46-lb. conductor. The supply is 500 volts direct-current, and there are 17 motor cars and 12 trailers.

Great Northern & City.—This system, opened in 1904, and serving between Finsbury Park (North London) and the City has been most disappointing in its traffic. The public seemed to know little of the existence of the railway long after it was operating because of insufficient advertising or pushing. The four miles (route) laid in tunnels of larger diameter than on any other tube line in London (on account of large electric locomotives being originally intended, though subsequently this was changed because of experience elsewhere) are worked on multiple unit control principle, with a 550-volt direct-current on an 80-lb. conductor rail; 4-ft. 8½-in. track, 85-lb. running rails. In all there are 32 motor cars and 44 trailers.

Baker Street & Waterloo, Charing Cross, Euston & Hampstead and Great Northern & Piccadilly.—These are the Speyer lines of 4.25, 7.8 and 9.25 route miles respectively. All are 4-ft. 8½-in. gage track with 90-lb. running rails and 85-lb. conductor rails, served with a 600-volt, direct-current converted and transformed down from the 11,000-volt three-phase current of the Lot's Road, Chelsea, generating station, which, it will be remembered, also serves the Metropolitan district system. These three tube railways together have 168 motor cars and 308 trailers.

The Metropolitan District has about 25 miles, with a service of 198 motor cars and 235 trailers—by far the greatest amount of rolling stock on any English electric line. Its line and station pressure is the same as for the three tubes just mentioned, but its running rails weigh 86 lbs. and its conductors 100 lbs.

Metropolitan Railway.—Like all other English electric lines the track is 4-ft. 8½-in. gage, with an 86-lb. running rail and 100-lb. conductor rails as in the case of the district. Its 26 route miles (and the many miles of other lines worked over) are served by 102 motor cars and 192 trailers, and the line and station pressure are the same as for the District. The Metropolitan has its own power station situated at Neasden.

Multiple unit control is in vogue on both lines, and both have third and fourth conductor rails. The most recent development that has taken place on the Metropolitan is an augmentation of the service by District trains. One part of the arrangement provides for the increase of the District main line service between Gloucester Road and the City from 30 to 34 trains per hour during busy times, and from 22 to 26 when traffic is light, an additional car being put on to all trains making them four to six-car trains in the two classes. A second "world's record" train (10 coaches), 500 ft. long, is to be put on for the early morning East Ham traffic.

Hammersmith & City.—This is a system of less than five route miles serving between Hammersmith & Addison Road to the city. Its 102-lb. conductor rail receives a 600-volt, direct-current converted and transformed down from the 6,500-volt, three-phase current which is generated at the Great Western Railroad Company's station at Park Royal. The running rails are 97½ lbs. A description of this system was given in the *Railroad Gazette* of July 20, 1906.

The foregoing exhausts the London systems save the London-Brighton new sections to which we refer later in this article. Outside of the metropolis there are five electric lines.

Liverpool Overhead.—This electric system was opened 15 years ago to serve a route which then sadly needed transport facilities, namely, the Liverpool dock district. Like other English pioneers in the electric railway field it has been called upon to pay a penalty. Not that experience has shown that electric traction was at fault as here applied—quite the contrary; but the line was laid before the municipal tramway fever had begun to spread. When municipal tramways are planned and laid it is too much to expect that the least regard shall be paid to what is due to private interests, however praiseworthy their enterprise may be. And so at Liverpool when the corporation laid its network of trolley lines the overhead electric felt it; later it suffered from a disastrous fire that occurred in one of its station tunnels; it has had to cut fares to meet competition, and then subsequently when the Lancashire & Yorkshire introduced its electrified service from Liverpool to Southport it was hit again. It is not surprising, therefore, to hear it said again and again at the meetings of the company that had it been imagined that all these other facilities were going to be available so soon thereafter the Liverpool Overhead Electric would never have had any existence at all. A few years ago admirable work was accomplished in accelerating the electric train service, and searching investigations and serious efforts have been made with a view to more economical running by abandoning some of the stations and in other ways, but it certainly seems that the hopes before the holder of ordinary stock are thin indeed. The length of the system is 6.5 route miles, and the line pressure is 500 volts direct current; gage, 4 ft. 8½ in.; running rails, 60 lbs. There are 44 motor cars and seven trailers.

Mersey Tunnel Railway.—This is a short tunnel line of less than five miles laid chiefly beneath the River Mersey and serving Birkenhead and Liverpool. It has been so frequently referred to in these pages that it needs little description. Its history is one of the most depressing and disastrous to investors, and its capital obligations are so great for the length of line that it must be a very long while before it can get its head really above water. But if it has failed financially it is still a most encouraging exemplification of the benefits that are to be conferred by electric traction. The decreased expenses, the greatly increased traffic, the improved comfort in traveling, the difference in the atmosphere (formerly the worst example of want of ventilation on any English line) since the electrical conversion in 1903—all these form most satisfactory reading, and the figures are used regularly by electrical experts in support of electrification arguments, though of course the railway is hardly one to compare with the usual surface railway system. The third rail, carrying a 600-volt direct current, is laid outside the running rails (86 lbs.), and the return rail is laid between them. The gage of track is 4 ft. 8½ in. There are 24 motor cars and 32 trailers. The board tried to promote traffic by running a few motor omnibuses, but the Birkenhead municipality, jealous of its trolley tramway system, and afraid of competition, kicked legally before the courts and won. There has been talk at different times of negotiations for the absorption of the concern by other railways, but there never has been any luck for the Mersey shareholder ever since the line was put down in 1886, and negotiation rumors have died away again.

Liverpool, Southport, Crossens & Aintrie.—This is the 28 route mile direct-current line of the Lancashire & Yorkshire Railway, electrified in 1904, and managed by J. A. F. Aspinall. The third rail (70 lbs.) is laid outside the 4-ft. 8½-in. track, and carries a 600-volt direct current; the fourth rail is laid between the running rails. There are 50 four-motor and 12 multiple unit coaches and 52 trailer cars. The four-coach trains have eight 150-h.p. motors per train, and the multiple unit coaches are equipped with two 125-h.p. motors per coach.

North Eastern.—Here there are about 30 miles (route) of system electrically working between Newcastle and Tyneside, they having been converted from steam working in 1904. A 600-volt direct-current is fed to the conductor rail, it having been first converted and transformed down from 6,000 volts three phase at which it is generated by the Newcastle Electric Supply Company. The system of operating is multiple unit control, with 58 motor cars and 44 trailers. A couple of electric locomotives serve for goods traffic.

Midland Railway.—This is the only single-phase railway system at work in the United Kingdom, and it consists of 10 route miles between Lancaster, Morecambe and Heysham harbor. It has only been open a few months, and although there was plenty of single phase experience abroad available already, the opening was welcomed because the application of the system on an English line would furnish more weighty evidence for the guidance of English engineers. The overhead wire carries a 6,600-volt single-phase alternating current, and there are at present only three motor cars and four trailers. One motor car was equipped by the Westinghouse Company as to one car, and two by the Siemens-Schuckert people. There are a number of points of special interest and originality in the equipments and overhead system.

L. B. & S. C. R.—It now only remains for us to deal with the other single-phase system, already briefly alluded to, i.e., the London, Brighton & South Coast, nine miles now completing between Victoria and London Bridge, and approximating to 23 miles of single line. In Victoria station five platform and two through lines, and in London Bridge station six platform lines are being electrically equipped. There will be put into service seven working trains and one spare, each train comprising two third-class motor coaches with luggage and motorman's compartments, each equipped with four 125-h.p. motors. The motor coaches form the first and last coach of a standard three-coach train, the middle one being a first-class trailer coach. A 10-minute service throughout the day is proposed, the time occupied by a journey from end to end being 25 minutes, including stops, as compared with 36 minutes at present required by the steam trains. Each three-coach train will seat 188 passengers. The coaches are of a modified form of side-entrance type so that passengers may pass from one coach to another when it is full without leaving the train.

The overhead conductor is a heavy ½-in. diameter grooved solid wire, which is supported at every few feet by means of dropper wires suspended from stranded steel catenary cables, which are in turn suspended from massive porcelain insulators through a double insulation which has been tested to ten times the working pressure. Specially designed steel structures support the insulators. A large number of different types of support have been designed owing to the constantly varying nature of the line. At each station the over-

head conductor is divided into sections, and specially constructed switchgear is here fitted in fireproof cabins for the control of the sections. Any section may thus be isolated in case of necessity, and for the safety of inspectors and repair men a system of interlocking has been devised. In case of emergency a signalman can by the use of simple electrical relays cut off the energy from the overhead line on the section under his control. There is a duplicate feeding system throughout the line. Energy is drawn from the generating station of the London Electric Supply Corporation. In the Denmark Hill tunnels, owing to the curvature of the line and other causes, practically every kind of construction is employed. Special foundations, with piling to a great depth, has been necessitated by the nature of the embankments in many cases.

AXLE-DRIVEN HEAD-END ELECTRIC TRAIN LIGHTING SYSTEM.

A scheme for current generation for electric train lighting, designed to combine the good features of present head-end and axle-light systems without their objections, has been worked out by W. J. Bohan, Electrical Engineer of the Northern Pacific. Mr. Bohan has been developing his idea for five years and has recently made tests on a four-car train over a 300-mile run with most satisfactory results. Drawings of his system applied to a six-wheel truck are shown herewith.

The wheel-piece of the standard wooden-frame truck is replaced with a cast-steel member, which forms part of the foundation for the generator-supporting frame, or sub-base, and also carries the jack shaft. On the transom is another steel casting, which forms the back legs of the sub-base. The two front castings of this frame are each forked to straddle the wheel, one side resting on the wheel-piece and the other on a steel casting substituted for the safety beam. A large base casting is bolted to these brackets, to which the generator is bolted.

The drive here shown is a silent chain, the sprocket on the axle being 18 in. in diameter, that on the jack shaft 8 in., and on the generator 6 in. These ratios are approximate only, being the ones chosen for the experimental installation. These chains are enclosed in dust-proof steel casings, and can run in oil if desirable or necessary. A gear can be substituted for the short chain drive, and probably a belt for the long chain, though this latter has not been given any serious consideration by the designer. The drawing shows a screw for raising and lowering the generator to adjust the chain. The openings in the car floor are covered by flexible diaphragms.

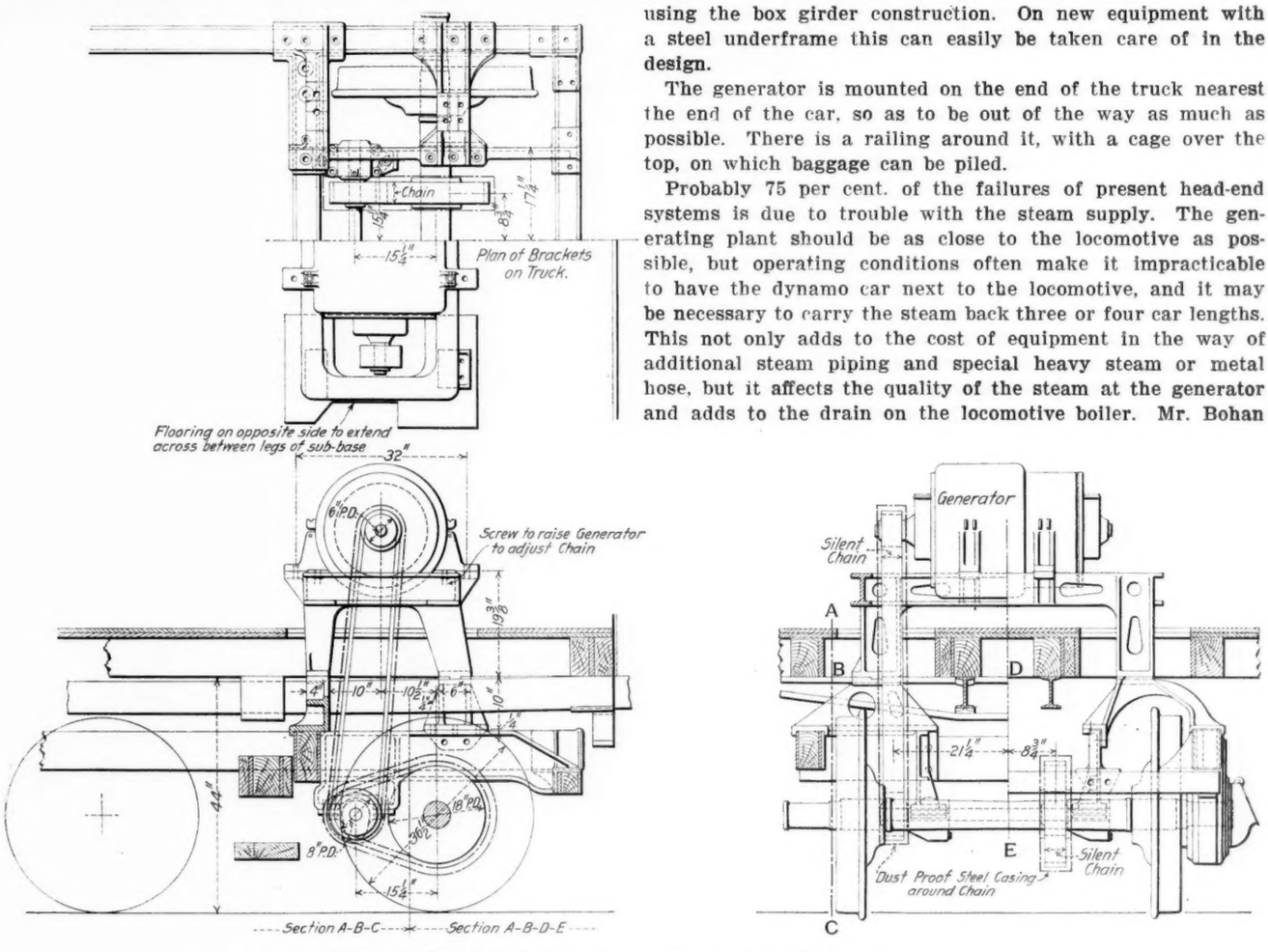
The motion of the generator when the car is running is the same as that of the truck, but actual test has shown this to be unimportant in its effect on the working of the outfit, and not sufficient to interfere in any way with making repairs to the equipment while running. Running around the sharpest curves does not affect the operation.

In case of removal of the truck, timbers can be placed under the generator, the chain and the sub-base bolts removed and the car jacked up. Truck repairs would be facilitated by having extra wheels and axles with sprockets mounted thereon.

Where a car has two intermediate sills the objection might be made that one of these on each side must be cut to admit the frame castings. This can be taken care of, however, by replacing this section of the sill with a box girder extending from bolster to car end. The inner end of this girder can be made to form the washer for the inside truss rod. If preferred, the other inter-sill may be made heavier instead of using the box girder construction. On new equipment with a steel underframe this can easily be taken care of in the design.

The generator is mounted on the end of the truck nearest the end of the car, so as to be out of the way as much as possible. There is a railing around it, with a cage over the top, on which baggage can be piled.

Probably 75 per cent. of the failures of present head-end systems is due to trouble with the steam supply. The generating plant should be as close to the locomotive as possible, but operating conditions often make it impracticable to have the dynamo car next to the locomotive, and it may be necessary to carry the steam back three or four car lengths. This not only adds to the cost of equipment in the way of additional steam piping and special heavy steam or metal hose, but it affects the quality of the steam at the generator and adds to the drain on the locomotive boiler. Mr. Bohan



Bohan's Head-End Axle-Driven Train Lighting System.

reports that tests on the Northern Pacific show the steam consumption for head-end systems to average 100 lbs. per k.w.h. at the locomotive boiler, in actual service, or about three times the consumption per drawbar h.p.h. of a modern passenger locomotive. This steam is being used continuously, of course, whether the train is running or standing. The heat from the steam engine in summer is also mentioned as an objection made by occupants of the car.

The object in developing this system was to provide one that would be simple and flexible, and applicable to present cars and wiring systems; also to minimize the amount of electrical apparatus necessary, and likewise first cost and maintenance and operating charges. The designer estimates that this scheme will meet 90 per cent. of all train lighting conditions, should all railways go to electric lighting, as present tendencies indicate. The first cost of the axle-driven head-end system would be about the same as the steam-driven, where the dynamo car is next to the locomotive. If there are other cars between the steam equipment cost is higher, of course, and heavy steam, or metal, hose adds further to this. In connection with the axle-driven system, it is proposed to limit the number of storage batteries to the requirements of local conditions. For example, on trains running solid betweeen terminals, two batteries only would be used, one on the dynamo car and one on the rear car. Where cars are diverted from the train at intermediate points each car so set out would have a battery.

In addition to the operating economies already pointed out, the system, by its automatic control, would do away with train electrians, which are now a considerable item of expense to some roads.

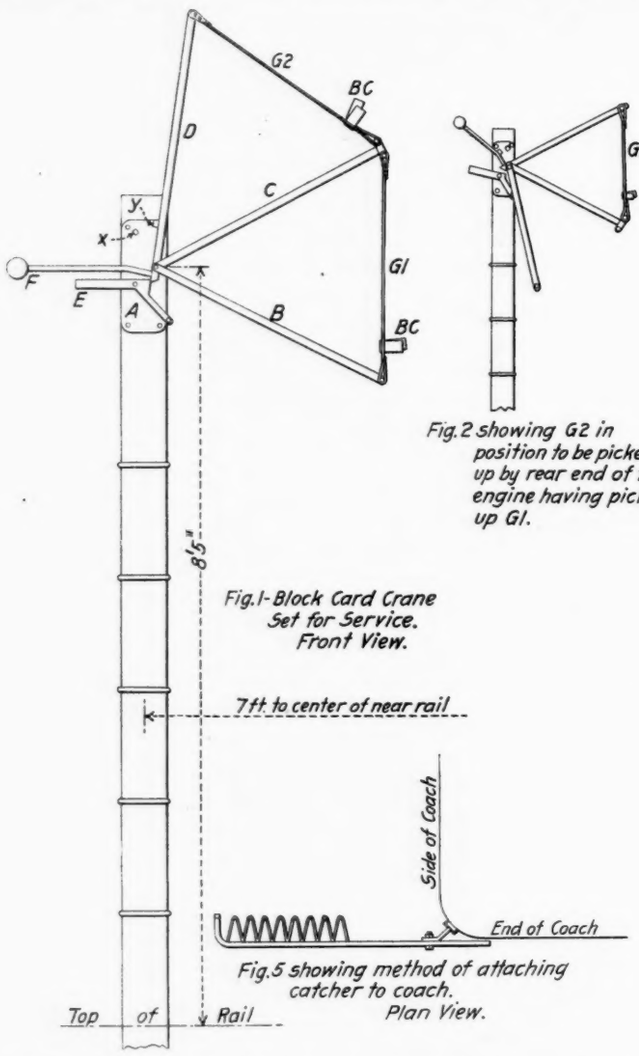


Fig.1-Block Card Crane Set for Service. Front View.

Fig.5 showing method of attaching catcher to coach. Plan View.

Beamer's Crane for Delivering Cards to Moving Trains.

Fig.2 showing G2 in position to be picked up by rear end of train; engine having picked up G1.

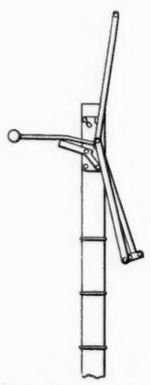


Fig.3 showing position of crane when train has passed.

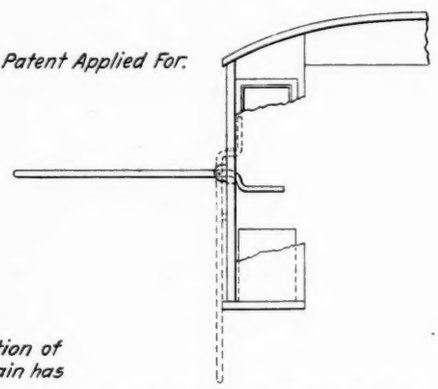


Fig.4 showing method of attaching catcher to engine. Rear View.

BEAMER'S BLOCK-CARD CRANE.

The apparatus used on the Northern Pacific for delivering block cards to rapidly moving trains, illustrated in the accompanying diagrams consists principally of a piece of rope, the size of old-fashioned bell cord, about 30 in. long, which is hung in a vertical position on a crane. When the rope comes in contact with the horizontal bar, attached to the passing engine or car, the impact produced by the motion of the train causes the rope to quickly whirl several times around the horizontal bar and at each turn the rope sticks between the wires of the loose coiled spring with which the horizontal bar is fitted; thus it is held and kept from falling to the ground.

The crane, Fig. 1, is 8 ft. 5 in. high from the level of the rail to the spindle supporting the arms, and it is set 7 ft. from the track. In Fig. 1 the arms, with the ropes, are in position to deliver the cards (B.C.), one fastened to each rope, to an approaching train. Rope G-1 is in position to deliver to the engineman. When this rope is caught by the engine, arm C falls by gravity to the position of B, and rope G-2 is then in position to be taken by the catcher on the caboose or rear car of the train. Arm B, in falling, strikes and depresses detent E, thus releasing arm D, which falls with arm C. The counterweight F, striking against stop x, keeps arm D from falling too far, and stop y limits the motion of F and D in the other direction.

Fig. 2 shows the position of the arms after the engine has passed and while rope B-2 is in working position; and Fig. 3 shows the position of the arms after the train has passed. Fig. 4 shows the locomotive fixture, and Fig. 5 the fixture for the rear of the train.

The behavior of this apparatus is reported as entirely satisfactory; cards have been picked up at all speeds up to 65 miles an hour. The catcher for the rear of the train is made to fit into the bracket used for supporting the tail lamps, and is detachable. Each train crew carries two of these rear-end catchers. They are made of ⅜-in. iron pipe.

No light is provided for the station crane, as the crane in each case is fixed directly in front of the telegraph office, so that the station signal light locates it.

The North-Eastern Railway of England has introduced an electric baggage car, designed to carry both parcels and fish. There are four compartments in the car, one at each end for the motorman, while the body of the car is divided at the center to form the separate luggage and fish compartments.

FORCED LUBRICATION FOR AXLE BOXES.*

This paper describes a system of forced lubrication as arranged for the driving axle boxes of some of the steam cars of the Taff Vale Railway.

The engine is carried on a four-wheeled truck of 9 ft. 6 in. wheel base and 2 ft. 10 in. diameter wheels, the boiler (of double-ended locomotive type, lying transversely across the frame) being placed immediately over the center of the leading or driving-axle. The front end of the coach is supported by a bogie center, carried between the frames, 4 ft. from the trailing-axle, or 5 ft. 6 in. from the leading-axle. When the car is loaded with its full complement of passengers, the weight on the driving-axle is 15 tons 13 cwts., the weight at the rail being 17 tons 6 cwts. The journals are 6 in. diameter by 9½ in. long; therefore the pressure, taking two-thirds of the projected area of the brass as bearing area, is 466 lbs.

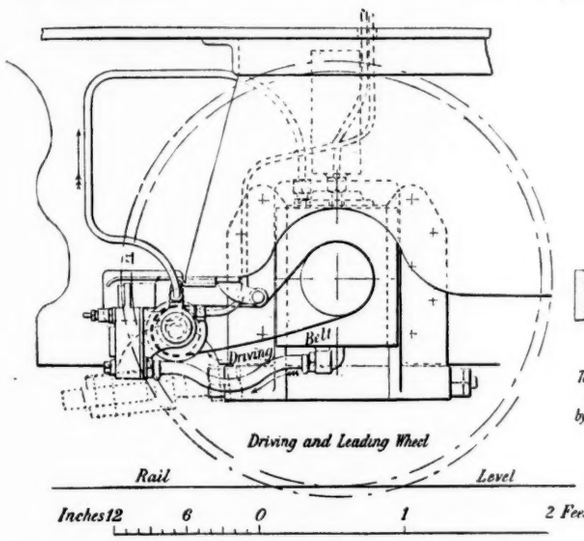


Fig. 1—General Arrangement of Piping for Forced Lubrication on Taff Vale Railway.

per sq. in., the number of the revolutions of the journal, at a speed of 30 miles per hour, being practically 300. With this pressure and high rubbing velocity an undue amount of oil was being used with the ordinary method of lubrication, while cases of the bearings running hot were not infrequent, therefore the following arrangement for lubricating the journals under pressure was adopted.

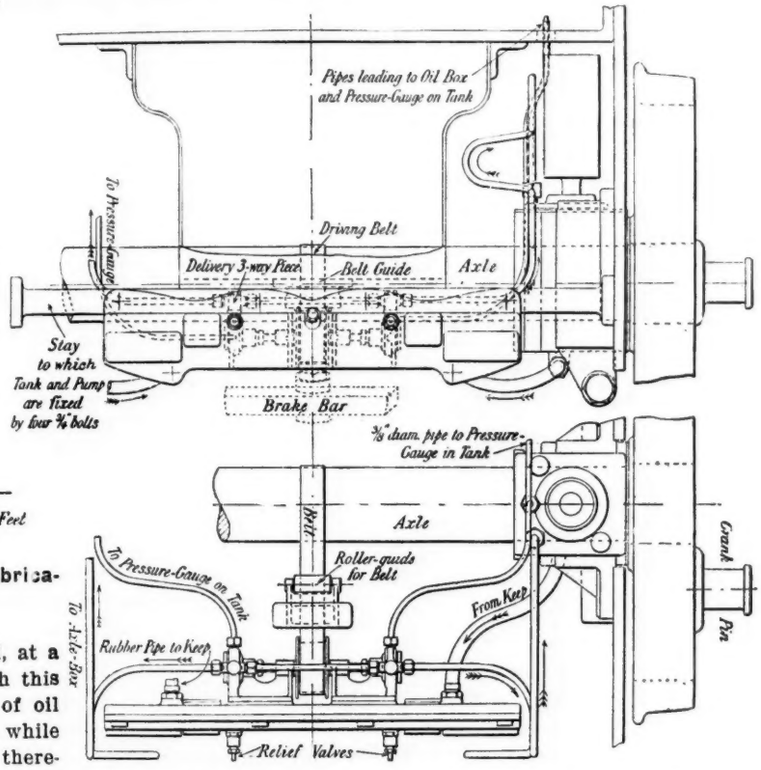
To a cross-stay in front of the driving-axle, Fig. 1, a small gun-metal tank of rectangular section is fixed. On the side of this tank, nearer the driving-axle and in connection with the tank, two small rotary pumps—right and left-handed—are fitted, the one for forward and the other for backward running. These pumps are driven directly from the driving-axle by a belt passing over a flanged pulley carried midway between the pumps, the pulley containing a roller clutch on each side, somewhat similar to a free-wheel arrangement, fixed to the driving-spindle of the pumps. By these means, the one belt drives either pump forward or backward, the other pump being free.

Following the process through, for the lubrication of one of the journals, when the car is in motion, oil is pumped from the tank and forced through a coiled copper pipe to the top of the axle-box, Fig. 2. An oil channel, 8¼ in. long, $\frac{3}{16}$-in. deep, is cut in the crown of the box, leaving a margin of metal at each side of the channel of ⅜-in. flat, which is found, when the box is properly bedded to the journal, to be sufficient to ensure its being perfectly oil-tight at the pressures attained.

*Abstract of paper read before the Institution of Mechanical Engineers, by T. Hurry Riches.

After passing around the journal, the return oil is collected in the axle-box keep, and then brought back to the tank by a flexible pipe which provides for the rise and fall of the axle-box, care being taken that the reservoir into which the oil is returned is directly below the keep to drain it. At each side of the axle-box keep a half-ring is fitted with bearing area about ⅜-in. wide. These half-rings are bedded well to the axles, and are supported upon two small coil springs which hold the rings up to the journal with a fair pressure, and so prevent the escape of oil along the journal on the bottom side. The supply tank is so arranged that the return oil, after draining from the keep into it, passes through a filter before being again sent through the pump.

Many points arise, however, in regard to the working of the arrangement which it will be well to explain. In the first place, the pumps when running fast, (at a speed of 30 miles per hour, the revolutions of the pump are 440 per min.)



carry a greater quantity of oil than can be accommodated in the circuit at a pressure of, say, 20 lbs. per sq. in. greater than which practice has proven unadvisable. A relief valve is therefore fitted to each pump with an adjustable spring which enables regulation of the pressure at which each pump shall work. The excess oil, when pumping, simply passes back into the tank again, through the relief valve against the pressure of the spring. A small pressure-gage connected to each pump, and fixed in the driver's cab, shows the pressure of the oil pumped on both forward and backward running, while also acting as an indicator should failure of either pump occur at any time. Should this happen, the ordinary system of lubrication, by a lubricating-box in the cab, is at hand. This lubricating-box is also necessary, to enable oil to be put into the axle-boxes after the car has been standing for a day or two.

To prevent the oil from flowing from the running pump into the other pump and causing it to run backward, a small ball-valve is placed in the three-way piece leading from each pump to the circuit. The movement of the axle-boxes relative to the tank and pumps was met in the first instance by trying different sorts of flexible piping, but finally, ordinary coiled copper piping was adopted, both on account of its comparative durability and of its accessibility.

The belt drive for the pumps gives a simple method of driv-

ing and one which allows for a small relative motion of the axle and pulley. It is apt, however, soon to become saturated with oil and then slipping occurs. An occasional application of one of the various belting mixtures, however, greatly reduces this slipping. When equal relief-valve springs were put in, it was noticed that the pressure indicated for forward and backward running varied considerably, probably due to the difference in the slip of the belt in each case. The filters in the tank are removable, and are taken out and cleaned at the end of each day's work, the oil being first drawn off through the stop-plug, the thicker part of the oil, after straining, being then replaced by a small supply of fresh oil.

The foregoing description shows one method of dealing with

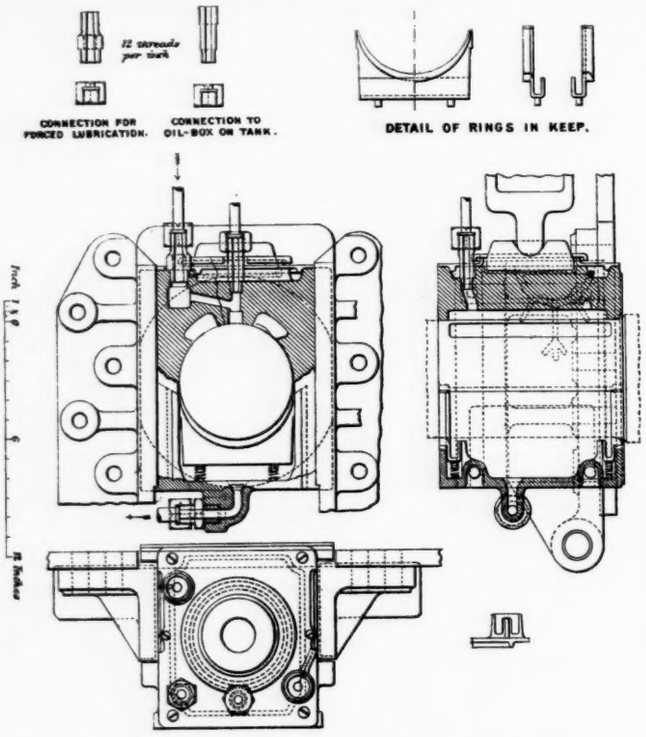


Fig. 2—Details of Journal Box; Taff Vale Railway.

an everyday problem in connection with the running of railway motor-cars, or any rolling stock in which the pressure on the bearings, combined with the rubbing velocity, is excessive. The matter is one of importance to all concerned in the design and care of such stock.

LOCOMOTIVE DETAILS.

With metallic packing of ordinary length, it is difficult to prevent leakage, and in recent practice the United States Metallic Packing Co., Philadelphia, Pa., has used a tandem packing for piston rods 4 in. in diameter or over. The packing rings and their cases are in duplicate, one of them placed in the usual way in the stuffing box of the cylinder head. The additional rings are in a projecting gland which is jointed to the cylinder head by copper wire and ⅞-in. studs. The drawing, Fig. 1, shows the tandem packing in section. Fig. 2 shows an improved form with lap joints in the ring.

Fig. 3 shows the present practice of the Chicago & Alton in fitting driving box bearings. These bearings are dove-tailed into the box on the crown, and the hub liner, which is integral with the journal bearing, is dove-tailed into the outside face of the box. The bronze bearing and liner is cast into the cast steel box without any machine finish on either. The only machine work is the boring of the journal bearing and the facing on the hub liner.

There has always been found in connection with locomotive piston valves the necessity for a relief valve, and the ordinary brass fixture like a check or safety valve has not been found satisfactory. The by-pass valve shown in the cut is one used by the Pennsylvania, the Alton and several other roads, and is regarded as a most satisfactory method of relieving over-pressure in the cylinder when piston valves are used. The fixture is placed on top of the piston valve chamber and the ports continued up to a flat valve face which is covered by an iron plate 10

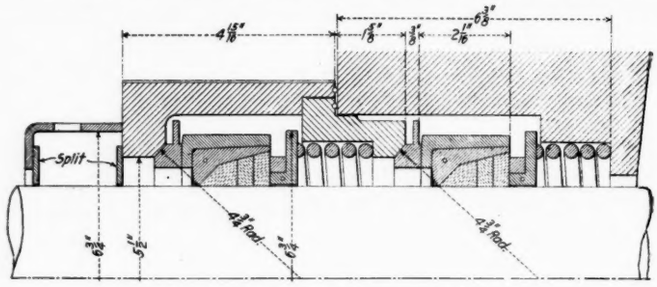


Fig. 1—U. S. Tandem Packing.

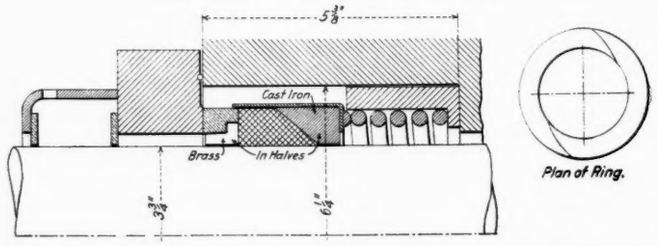


Fig 2—U S. Improvement Packing With Lap Joint Rings.

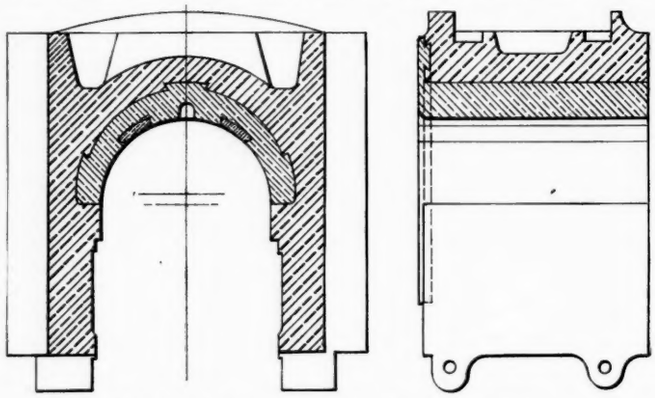


Fig. 3—Chicago & Alton Driving Box.

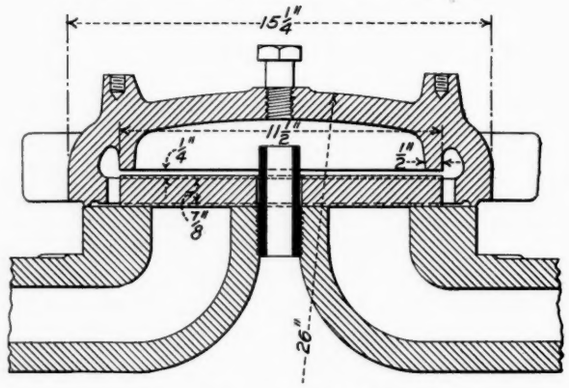


Fig. 4—By-Pass Valve.

in. x 11½ in. x 1 in. thick. The under surface covers the ports connecting the two ends of the cylinders and the upper face is under boiler pressure through a pipe from the steam chest, as shown in the general arrangement, Fig. 4. If the pressure in either end of the cylinder should increase to a dangerous degree the plate will lift ⅛ in. against boiler pressure and allow steam to pass to the opposite end of the cylinder, thus relieving the pressure.

General News Section.

The Colorado State Board of Equalization has increased the assessment of railway, telephone, sleeping car, and other public service corporations in that state from $25,780,187 to $56,355,790, an advance of $4,277,603 over last year.

Under an agreement between the attorney-general of Georgia and the railway companies, the state law requiring the use of electric headlights on main lines is to be tested in the courts, pending which there will be no prosecutions for non-compliance.

Announcing the adoption of the American Railway Association's revised rules for the transportation of inflammable articles and acids, an officer of the Pennsylvania Railroad says that one road—presumably his own—carried in 1906 over 45,000 tons of explosives, using for these shipments 19,000 cars; which indicates a very large proportion of L. C. L. shipments.

The Indiana Railroad Commission on June 29 held its third conference with railway officers and locomotive engineers concerning headlights. As in the previous conferences the enginemen were unanimously in favor of the oil lamp. At a conference in Evansville some enginemen spoke in favor of the electric light. The majority of those present were from the Evansville & Terre Haute, a part of the Frisco system. The commission visited the Schroeder headlight factory in Evansville, where tests were made and comparisons shown between electric and oil lamps.

A. Mathias, of New Orleans, a commercial salesman, recently wrote to E. H. Harriman, suggesting that the officers of the Harriman lines keep more closely in touch with public sentiment by keeping in close touch with traveling men. The suggestion favorably impressed Mr. Harriman, who sent the letter to Mr. Kruttschnitt; and he has sent out a circular to subordinate officers suggesting that both operating and traffic officers, when practicable, attend meetings of traveling salesman in their territory and keep in contact with them, with a view to finding out how the public pulse is beating.

The Twentieth Century Limited Express of the New York Central and the Lake Shore, eastbound, was run from February 17 to June 20, 123 days, with only 10 minutes aggregate delay, and there was an average of nine cars on the train each day, which, however, includes, apparently, some days on which the train was run in two sections. Two sections were run on eight different days, and on one day there were 11 cars in a single train. No helping engines were used on any part of the journey. New York Central Pacific type locomotives, weighing 133 tons each, are used on this train. When two sections were run the two came into the Grand Central station at New York side by side, along the same platform, both at the same moment. When necessary, in order to accommodate the passengers with promptness, two dining cars are run on this train.

In the Canal Zone the terrors of section 22 evidently have no force, for on Independence Day, July 5, everybody carried on the trains of the Panama Railroad rode free—and the company was not stingy in the number of trains, seven being run through each way over the whole length of the road. The trains due to start from either end of the line at 10 p.m. waited until after the close of the exhibitions of fireworks, and those scheduled to start at 1 o'clock the next morning were held until after the dances. These midnight trains were "limited," in that the road reserved the right to exclude objectionable passengers—a rule which might well be applied with more severity on some midnight trains outside the Canal Zone. The Panama Railroad time-tables announcing the regular and extra trains for Independence Day were printed on sheets bordered with prints of little flags in red, white and blue.

The Cunard Steamship Line announces that beginning with the sailing of the "Lusitania" from New York, July 28, the New York-Liverpool ships of the line will call at Fishguard, on the coast of Pembrokeshire, South Wales, an arrangement which will land passengers in London at least six hours sooner than would be possible if they went through to Liverpool and landed there. It is expected that by this arrangement the fastest steamers will land passengers in London Monday nights (sailing from New York on Wednesdays), while the "Campania" and "Lucania" will land them in the metropolis Tuesday nights. Fishguard is the terminus of a line of the Great Western, whence fast turbine steamships make the run to Rosslare, Ireland, in 2 hours 45 minutes. The Cunard people hope also to have the westbound vessels call at Fishguard, and there take on the mails from London; and then, having to make a shorter stop at Queenstown (for the Irish mails), the fastest vessels, leaving Liverpool Saturday, can get into New York Thursday evening, instead of Friday, as is now the case. Passengers can leave London at 6 p.m. and arrive at Fishguard at 11 p.m., and it is expected that it will be possible to get away from Queenstown at 6 or 7 the next morning. Passengers could leave Paris at 9 a.m. and connect with the train leaving London at 6 p.m.

The Houston F. & N.

After an expenditure of $80,000, the establishing of offices, arranging for the purchase of equipment and announcing the date of beginning of traffic, the Houston, Fostoria & Northern Railway has been forced to suspend building operations, recall time schedules and traffic orders, cancel orders for equipment and break contracts, and the promoters of the road stand a fair chance of losing on the project. All of this is brought about by a recent enactment of the State legislature which becomes effective on January 1, 1910, requiring that each car and engine shall be equipped with automatic coupler and that drawbars shall not be more than 34½ in. high nor less than 31½ inches. Other restrictions are included in the new law. The Houston, Fostoria & Northern, and other roads built through a rough, uneven country, and designed principally for handling logs, cannot use automatic couplers as all forms in use slide up and down and would become uncoupled.

On account of the nature of the track and the country traversed, links and pins must be used on the trains; but these are debarred by the State.—*Houston (Texas) Post.*

New Buildings at the Grand Central.

The plan of the New York Central to cover its extensive new yard at the Grand Central station, New York city, with office buildings is to be carried out at once, on a portion of the ground. An agreement has been made with the Nicholls-Ritter Realty & Financial Co., of St. Louis, which has a New York office at Broadway and Twenty-third street, to put up two 12-story buildings, each 200 ft. x 275 ft., and through the "Merchants & Manufacturers' Exchange" arrangements have already been made for the occupancy of a considerable part of the space in the new buildings.

The buildings will front eastward on Lexington avenue, will extend westward 275 ft. to the line of Depew place, and will be bound north and south by Forty-sixth and Forty-eighth streets, with Forty-seventh street between them. The ground beneath these buildings is already occupied by the tracks and platforms which constitute the temporary "Lexington Avenue Terminal," which is being used by a large part of the trains pending the rebuilding of the central part of the Grand Central station. Immediately south of Forty-sixth street and also covering these tracks is a building, similar to those now proposed, which has been put up by the railway company for its own offices. According to the announcement in the newspapers, the New York, New Haven & Hartford is a partner with the New York Central in the construction of the new buildings, although the New Haven, as we understand it, has no title in the land. The Merchants & Manufacturers' Exchange is to take a lease of the buildings for a long term. Together they will cost $3,500,000. The plans show stores on the east, the

north and the south fronts, opening on the streets, the spaces occupied by the railway tracks and platforms being all below the level of the street. Forty-sixth, Forty-seventh, Forty-eighth and other streets are to cross the new yard on bridges.

The Merchants & Manufacturers' Exchange is to be capitalized at $1,000,000, and a list of names of directors published includes George C. Smith, of the Westinghouse Companies, and Alexander M. Stewart, of James Stewart & Co., building contractors, New York. One of the buildings is to be occupied in large part by the New York Furniture Exchange, which manages the wholesale salesrooms of 300 furniture manufacturers, now housed in the Grand Central Palace, one block south of the new location. The Merchants & Manufacturers' Exchange proposes to establish exhibits of other kinds of merchandise, after the manner of the furniture exchange.

Further Rapid Transit Proposals in New York.

The Interborough Rapid Transit Company has submitted to the New York State Public Service Commission plans for extensive additions of the subway lines. [The proposals of a rival, the Bradley-Gaffney-Steers Company, were given in our issue of June 25, page 1537]. The proposals now presented provide for the extension of the present subway northward under Lexington and Third avenues and a southerly extension on the west side of the city from Long Acre Square to the Battery; aditional elevated tracks for express service; the connecting of the Steinway tunnel with the present subway; a subway under Canal street, which will permit the running of Interborough trains over Manhattan bridge to connect with the present subway in Brooklyn, and an elevated line connecting the Second avenue elevated with the Queensboro bridge. The plans in detail are:

1. A four-track subway extension connecting with the existing subway at about 36th street and Fourth avenue and running from that point under Lexington avenue to about 46th street.

2. A two-track subway extension connecting with the four tracks above proposed from a point near 46th street, running north under Lexington avenue to East 129th street and the Harlem river; same to be used for purely local service and connecting with all of the existing subways and the subways that we now propose.

3. A two-track subway connecting with the proposed four-track subway on Lexington avenue and about 46th street, and then under Third avenue northerly, passing under the Harlem river to East 149th street, the Melrose district of the Bronx, there again connecting with the existing subway to West Farms and devoted solely to express service of the most rapid kind.

4. A four-track subway extension on the West Side connecting at Times square with the present subway and running under Seventh avenue and Varick street to Canal street.

5. From Varick street or West Broadway, a two-track subway extension southerly via West Broadway to Greenwich street, southerly via Greenwich street to the Battery and there looped into the present subway.

6. A two-track subway commencing at Varick street or West Broadway running easterly under Canal street to and over the Manhattan Bridge to Nevins street in Brooklyn and there connecting with the existing city's subway to Flatbush avenue.

7. A two-track subway extension from Park avenue and 42d street through the Steinway tunnel into Long Island City, Queens County, at Van Alst avenue.

Elevated Lines.

1. A two-track elevated extension from Eighth avenue and 149th street on the West Side over the McCombs Dam bridge, with a third track beginning at about 162d street, out Jerome avenue to the reservoir, three blocks beyond the Fordham road.

2. A two-track Second avenue extension from Chatham square to the City Hall, thus enabling Second avenue passengers to go directly to the Brooklyn Bridge and providing there a four-track terminal.

3. One new track for express service on the Second avenue elevated to the Harlem river.

4. One new track on the Third avenue road from Chatham square to 42d street, which, with certain changes at 116th street and 125th street and Eighth avenue, will permit an express service on a third track from Rector street to 155th street, a distance of 9½ miles, and thence along the proposed Jerome avenue extension a distance of three miles more.

6. Connect two of the existing tracks on the Queensboro Bridge to the Second avenue elevated line at or near 59th street. Between 55th and 59th streets the Second avenue line will contain four tracks. This will give an elevated railway connection from the plaza of the Queensboro Bridge in Long Island City direct to the City Hall or South Ferry station of the Manhattan Elevated roads, via Second avenue, together with a connection with the existing elevated roads in Manhattan Island and the Bronx, with a single five-cent fare.

The estimated cost of the whole scheme is $100,000,000, and while Mr. Shonts in a statement he gave out intimated that his company would be prepared to build with its own money he said that the company would preferably have the subway extensions regarded as part of the existing system, owned by the city. The plans call for the construction of 68½ miles of new tracks in the city, 44 miles being underground with 24½ of elevated lines. The Steinway tunnel is made a part of the pian, which, if adopted, would give to the Interborough company the franchise it has been seeking, the right to operate the tunnel.

The company is willing to operate the new roads at a fixed rental, or under a profit-sharing arrangement, whereby, after deducting operating expenses, taxes, payments to reserve and amortization funds and the return to the contractor of an agreed percentage on the cost of construction, if the cost of construction should be assumed by the contractor the surplus earnings shall be divided between the city and the contractor.

Pennsylvania Railroad Wages.

In 1908 the Pennsylvania Railroad System, East and West of Pittsburgh, paid out in wages $125,543,947, a reduction of $29,471,951 as compared with the $155,015,898 expended in 1907. In 1907 199,000 men were employed, while in 1908 the number was 175,000, a reduction of 24,000.

Though there was such a large decrease in the total sum paid, the rate of wages in 1907 was maintained for all classes of employees without abatement through 1908. There were some reductions in hours in 1908 which affected the gross sums earned by certain classes of employees, but no changes were made in rates of pay. In 1907 the company paid for labor a sum equivalent to 48 per cent. of its total earnings from operation, and in 1908 46 per cent. The necessity on the part of a railway company to keep most of its plant going even in times of severe business depression makes impossible an adjustment of its expenditures to its earnings such as a manufacturer may bring about. One of the larget manufacturing companies in the country in 1907 paid $160,825,822 for the wages of an average of 210,180 men, against the railway's payment of $155,015,898 to an average of 199,000 men; yet when the slump came in 1908 the manufacturer was able to reduce his force to 165,000 men and his payments to $120,510,829, a decrease of 45,000 men and over $40,000,000 in wages, while the railway company could curtail its force by but 24,000 men and thereby reduce its wage payments by $30,000,000.

Baltimore & Ohio Relief Department Extended.

The Baltimore & Ohio has extended over the Baltimore & Ohio Southwestern, the Relief, Savings, Loan and Pension Features of the Relief Department. Following precedents there will at the start be no exclusion from membership on account of age, nor will there be a physical examination. All in active service have the opportunity of becoming members without restriction as to age. At the expiration of ninety days from July 1st those in the service not having profited by the privilege when it was extended to them and subsequently wishing to become members, as also all new employees, will be subject to the regular age and physical condition provisions.

Joining on the part of the present B. & S. W. employees is entirely voluntary, and whether or not they do so will make no difference in their standing with the company. Employees of the B. & O. who were in the service in 1880, when the Relief Association was inaugurated, and who did not become members, are still on the Company's pay rolls. Much the larger proportion, however, availed of the advantages of membership in the department.

The B. & O. relief is the pioneer of all such railroad employees' welfare organizations in the country, the past month marking the twenty-ninth anniversary of its inauguration. Under its provisions what are termed "benefits" are paid to members when incapacitated for active duty by sickness or temporarily or permanently disabled by accident.

The disbursements of the Relief Feature since its inception

have been close to fifteen million dollars. The Saving Feature has afforded a convenient and secure medium for employees savings, paying from 5 to 5½ per cent. interest regularly. The last report showed $4,402,697 on deposit, with loans to employees, members of the department, aggregating $2,759,618 for the purpose of acquiring or improving homes. Through the operations of the Savings Department loans aggregating $8,000,000 have been made to employees and invested in homes.

There are now carried upon the pension rolls upwards of 550 old employees and there have been disbursed approximately a million and a quarter dollars for the purpose of this feature, the entire fund being supplied by the railway company.

Tennessee Coal & Iron Company.

It is reported from Birmingham, Ala., the Tennessee Coal, Iron & Railroad Company has secured large tracts of land on the Warrior River just west of Birmingham, whence, on completion of river improvements now under way, coal will be sent to New Orleans and Cuba in vessels which will bring back Cuban ore for use in Alabama furnaces. Extensive riparian rights have been secured. The Tennessee Company evidently is determined to control the transportation of raw material within the territory of its furnaces and mines. The company already owns the Birmingham Southern, a line which penetrates many of its industrial fields, and is said to be after the Birmingham Mineral.—*Wall Street Journal.*

State Regulation in New York City.

The New York State Public Service Commission, first district, has completed its second year and Chairman Willcox thinks that the improvements which have been brought about in the general transit situation of New York city have fully justified the creation of the commission.

"The commission," he says, "has encouraged the entrance of competitors into the traction field and has framed a law which was passed by the Legislature amending the rapid transit act, so that the city has now three ways of building rapid transit lines, against one method allowed by the old law. It has also proposed and advocated the passage of a constitutional amendment, which will be submitted to the people next fall, providing that bonds used for the construction of self-supporting rapid transit lines will not be included in computing the debt limit, thus adding about $100,000,000 to the city's borrowing capacity."

The commission has made the trolley companies renew and repair their rolling stock, with the result that blockades on the Brooklyn bridge have almost entirely disappeared. The subway in Manhattan also has been improved in many ways. The commission has brought about improvement in service on the surface lines in all parts of the city. While it is impossible with present facilities to provide every passenger with a seat during the rush hours, the companies have responded to the efforts of the commission to obtain better service with excellent results. The overloading and crowding on most of the surface lines have been materially lessened.

A Revenue Train Load of 5,544 Tons.

The record performance reported by the Pennsylvania Railroad, June 18, (*Railroad Age Gazette*, June 25, page 1539) was on June 22 exceeded by 502 tons, the same engine, No. 1113, Class H-8-b, moving from Altoona to Enola, near Harrisburg, 127 miles, a train of 105 steel cars loaded with 5,544 tons of coal in 7 hours 12 minutes, or at an average speed of 17.6 miles an hour. The train was 3,600 ft. long—more than two-thirds of a mile. The steepest adverse grade is 12 ft. per mile.

Railroad Club of Kansas City.

The following officers have been elected for the ensuing year: President, Wallace A. McGowan (N. Y. C. & St. L.); first vice-president, James L. Marens (St. L. & S. W.); second vice-president, E. R. Duskey; secretary, Claud Manlove; chairman entertainment committee, W. E. Parrott (Vandalia); chairman house committee, Earl D. Spears (Nelson Morris Packing Co.); chairman finance committee, Chan D. Campbell.

American Street and Interurban Railway Association.

The date originally fixed for holding the 1909 convention at Denver, Col., was the week beginning October 18. Since this decision was reached, however, a decided preference has been manifested toward a change of date and the selection of a convention week which would enable members to take advantage of the attractive railway rates which continue in effect until Sept. 30 and are good for return until October 31. These rates would enable convention visitors to continue on to the Seattle Exposition and to other Pacific coast points with but a comparatively small increase in the round-trip fare. The convention will, therefore, be held on October 4, 5, 6, 7 and 8.

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.
AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Scranton, Pa.
AMERICAN ASSOC. OF LOCAL FREIGHT AGENTS' ASS'NS.—G. W. Dennison, Penna. Co., Toledo, Ohio
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—R. W. Pope, 33 West 39th St., New York: second Friday in month; New York.
AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 24 Park Place, New York.
AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—S. F. Patterson, B. & M., Concord, N. H.; Oct. 19, 1909; Jacksonville, Fla.
AMERICAN RAILWAY ENGINEERING AND MAINT. OF WAY ASSOC.—E. H. Fritch, Monadnock Bldg., Chicago.
AMERICAN RAILWAY INDUSTRIAL ASSOCIATION.—R. E. Wilson, Ry. Exchange, Chicago.
AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. Edgar Marburg, Univ. of Pa., Philadelphia.
AMERICAN SOCIETY OF CIVIL ENGINEERS.—C. W. Hunt, 220 W. 57th St., N. Y.; 1st and 3d Wed., except July and August; New York.
AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., N.Y.; 2d Tues. in month: annual, Dec. 7-10; New York.
AMERICAN STREET AND INTERURBAN RAILWAY ASSOCIATION.—B. V. Swenson, 29 W. 39th St., New York: Oct. 18-22; Denver, Colo.
ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, 143 Dearborn St., Chicago.
ASSOCIATION OF RAILWAY CLAIM AGENTS.—E. H. Hemus, A., T. & S. F., Topeka, Kan.
ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, Wisconsin Central Ry., Chicago.
ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 24 Park Place, New York.
CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 1st Tues. in month, except June, July and Aug.; Montreal.
CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod. Montreal, Que.; irregular, usually weekly; Montreal.
CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Libery St., New York; 2d Friday in January, March, May, Sept. and Nov.; Buffalo.
FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Rich., Fred. & Pot. R. R., Richmond, Va.
INTERNATIONAL MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.
INTERNATIONAL RAILWAY FUEL ASSOCIATION.—D. B. Sebastian, La Salle St. Station, Chicago.
INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—E. C. Cook, Royal Insurance Bldg., Chicago.
IOWA RAILWAY CLUB.—W. B. Harrison, Union Station, Des Moines, Ia.; 2d Friday in month; except July and August; Des Moines.
MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Old Colony Bldg., Chicago.
NEW ENGLAND RAILROAD CLUB.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tues. in month, ex. June, July, Aug. and Sept.; Boston.
NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August; New York.
NORTH-WEST RAILWAY CLUB.—T. W. Flannagan, Soo Line, Minn.; 1st Tues. after 2d Mon., ex. June, July, August; St. Paul and Minn.
RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, Pittsburgh, Pa.; 4th Friday in month; except June, July and August; Pittsburgh.
RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, 12 North Linden St., Bethlehem, Pa.
RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.
ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—Walter E. Emery, P. & P. U. Ry., Peoria, Ill.; Nov., 1909; Washington.
ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug.; St. Louis.
SOCIETY OF RAILWAY FINANCIAL OFFICERS.—C. Norquist, Chicago; Sept. 7-8: Fort William Henry, Lake George, N. Y.
SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—J. H. O'Donnell, Bogalusa, La.
SOUTHERN AND SOUTHWESTERN RY. CLUB.—A. J. Merrill, Prudential Bldg., Atlanta; 3d Thurs., Jan., April, Aug. and Nov.; Atlanta.
TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R. R.R., East Buffalo, N. Y.; September, 1909; Denver.
WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, 199 Chestnut St.; Winnipeg; 2d Mon., ex. June, July and Aug.; Winnipeg.
WESTERN RAILWAY CLUB.—J. W. Taylor, Old Colony Bldg., Chicago; 3d Tuesday each month, except June, July and August; Chicago.
WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, Monadnock Bldg., Chicago; 1st Wednesday, except July and August; Chicago.

Traffic News.

The Traffic Club of St. Louis gave its first dinner of the summer season at Delmar Garden, on June 23.

It is announced that the Chicago, Milwaukee & Puget Sound and the Oregon Railroad & Navigation Company will interchange traffic at Plummer, Idaho.

The Chicago, Rock Island & Pacific has been giving phonographic concerts on its new train from Chicago to Denver, the "Mountaineer." The concerts have proved so popular that it has been decided to give them on others of this road's "crack" trains, and for this purpose ten phonographs have been ordered.

The Chicago & North Western and the Union Pacific had seven personally conducted tours during the season of 1907. These proved so popular that they will give 15 such tours this season. There will be ten 14-day and one 15-day tours to Yellowstone Park, Utah and Colorado; two 25-day trips to California and two trips to the Alaska-Yukon-Pacific Exposition. For these trips special trains are run.

Condition of the Cotton Crop.

The crop reporting board of the United States Department of Agriculture estimates that the condition of the cotton crop on June 25 was 74.6 per cent. of a normal as compared with 81.1 on May 25, 1909; 81.2 on June 25, 1908; 72.0 on June 25, 1907, and 80.8 the average of the past ten years on June 25.

Comparisons of conditions, by states, is given in the following table.

States.	June 25, 1909.	May 25, 1909.	June 25, 1908.	June 25, 1907.	June 25, 10-yr.av.
Virginia	76	85	92	65	84
North Carolina	75	83	89	72	84
South Carolina	77	83	84	79	81
Georgia	79	84	83	78	81
Florida	88	91	84	83	85
Alabama	64	83	82	68	80
Mississippi	61	78	84	67	80
Louisiana	62	74	80	66	81
Texas	79	78	80	72	80
Arkansas	76	84	85	67	81
Tennessee	80	85	89	69	84
Missouri	83	93	87	64	84
Oklahoma	84	84	64	74	82
United States	74.6	81.1	81.2	72.0	80.8

INTERSTATE COMMERCE COMMISSION.

The section of the Act to Regulate Commerce which gives the Interstate Commerce Commission power to order a road to build a switch track connection with a private side track, does not give the commission power to order a road to build the private siding as well. (16, I. C. C., 587.)

The first shipments of canned peaches from a new point of production moved under class rates. The carrier thereafter established commodity rates from that point, which were adjusted with relation to other producing points similarly situated, and which were designed to provide for further movements. Reparation awarded upon the basis of the commodity rates thus established. (16 I. C. C. 523.)

A certain firm enclosed a safety pin with each bar of its soap. Soap in L. C. L. quantities takes fourth-class rates in western classification. Safety pins take first-class rates, but, in the case cited, it is held that the inclusion of a safety pin with each cake of soap is in the nature of a trade mark on the soap and is in no sense a premium, and that therefore packages of soap in L. C. L. quantities should take fourth-class rates. (16, I. C. C., 444.)

Date of Original Shipment.

Interstate Remedy Co. v. American Express Co. Opinion by Commissioner Lane.

The date of original shipment determines the rights, privileges and obligations attaching to that shipment throughout its transportation. Prior to May 20, 1908, defendant's tariffs provided certain charges for the return shipment of C. O. D. packages of medicine; effective May 20, 1908, these tariff provisions were canceled and provision made for the assessment of regular merchandise rates on such traffic. As to shipments moving prior to May 20, 1908, and returning subsequent thereto, the tariff provisions in effect prior to that date govern the assessment of charges.

Free Time at Philadelphia.

William F. Brey, as chairman of a committee of the Commercial Exchange of Philadelphia, v. Pennsylvania et al. Opinion by Commissioner Cockrell.

Complainant alleges unlawful discrimination against Philadelphia in favor of New York in the matter of free time for the unloading of flour. While there might be circumstances from a transportation standpoint that would justify the difference in time, no opinion is expressed on this point, but the decision rests on the ground that competition exists at New York which does not exist in Philadelphia, and such competition justifies a longer free time at New York.

Complainant contends that such discrimination ought not to exist, because the Philadelphia roads have the right to extend the free delivery time in Philadelphia to equal that at New York, but if defendants voluntarily extend the time at Philadelphia they must treat alike all points similarly situated, and there might arise a duty to extend the benefit to every other non-competitive point.

Discrimination Against Texas Common Points.

P. P. Williams Co. v. Vicksburg, Shreveport & Pacific et al. Opinion by Commissioner Cockrell.

Complainant attacked the rate adjustment from Mississippi river crossings to Texas common points and asked for lower rates from Vicksburg, Miss., to certain points in northeast Texas. It appears that Vicksburg has the same rates to Texas common points as New Orleans and somewhat lower rates than Memphis, which city intervenes and asks still lower rates for itself.

To grant any part of the contentions of complainant or interveners would be to disrupt the grouping of Texas common points, or to rearrange the whole fabric of rates from the Mississippi river. Differentials diminish with increasing distance and vanish when the mileage on which they are based becomes inconsiderable in proportion to the total mileage from basing point to destination. The evidence was not sufficient either in character or in amount to justify the order prayed for. Complaint dismissed.

Limitation to the Power of the Commission.

Commercial Club of Hattiesburg v. Alabama Great Southern et al. Opinion by Commissioner Clark.

This complaint attacks as unreasonable and discriminatory the general adjustment of rates to and from Hattiesburg, Miss., as compared with rates to and from New Orleans, La.; Mobile, Ala.; Gulfport, Miss., Natchez, Vicksburg, Jackson and Meridian.

Defendants find no difficulty in defending the grouping of Vicksburg, Natchez, New Orleans, Gulfport and Mobile, on the ground that the conditions at those places are similar and are dissimilar to those at other neighboring and intermediate points. Just to the west of Vicksburg are Shreveport, Alexandria and Monroe in a well-established group, which this commission has recently declined to order dissolution of. Just east in Alabama are other groups, established, maintained and defended upon the same ground. And Jackson and Meridian are grouped, and that grouping is maintained and defended on the same reasons and arguments. Of course, carriers may voluntarily do many things which they may not lawfully be compelled to do. Some of these defendants could, if they chose, add Hattiesburg to the Jackson-Meridian group, and the others could meet the competition thus created at Hattiesburg, and all of them could no doubt defend that action as strongly and logically as they now defend the Jackson-Meridian group. The commission cannot, however, find that, as a matter of law, Hattiesburg must be grouped with Jackson and Meridian. However strongly the commission might feel inclined to relieve the conditions complained of, its actions must be within the provisions of the law.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF MAY, 1909.

Name of road.	Mileage operated at end of period.	Operating revenues			Operating expenses						Net operating revenues (or deficit).	Outside operations. net.	Taxes.	Operating income (or loss).	Increase (or dec.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total, inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Atchison, Topeka & Santa Fe	7,458	$4,479,323	$1,558,020	$6,645,052	$870,069	$964,427	$149,998	$1,819,010	$132,053	$3,935,557	$2,709,495	.....	$234,060	$2,475,435	$514,632
Atlantic Coast Line	4,469	1,520,930	449,516	2,152,584	312,990	337,480	34,935	742,558	62,708	1,490,671	661,913	.....	103,013	558,900	108,988
Boston & Maine	2,242	1,976,707	1,100,673	3,339,937	284,481	441,531	60,695	1,345,702	77,908	2,210,317	1,129,620	$4,332	157,421	976,531	278,987
Central of New Jersey	668	1,282,469	372,525	1,743,671	212,084	321,604	25,257	500,951	40,396	1,100,292	643,379	3,710	77,097	569,992	†181,515
Chesapeake & Ohio	1,896	1,895,989	378,355	2,393,639	278,882	465,508	41,670	624,903	43,419	1,454,382	939,257	23,127*	67,100	849,030	278,227
Chicago & North Western	7,634	3,505,450	1,286,887	5,274,382	864,446	674,154	83,745	1,981,326	92,891	3,696,562	1,577,820	1,126	220,000	1,358,946	87,282
Chicago, Burlington & Quincy	9,023	4,032,168	1,545,580	6,139,750	1,643,144	1,144,922	134,723	1,988,719	188,869	5,100,377	1,039,373	17,430*	212,600	809,343	168,075
Chicago, Rock Island & Pacific	7,414	2,835,980	1,270,395	4,401,519	567,315	511,718	113,819	1,674,362	130,224	2,997,438	1,404,081	12,552*	193,253	1,198,279	400,515
Chicago, St. Paul., Minn. & Omaha	1,739	664,050	278,113	1,011,253	135,068	148,662	22,658	403,821	25,625	735,834	275,419	1,532*	53,008	220,879	†10,242
Cleve., Cin., Chic. & St. Louis	1,982	1,377,045	543,142	2,130,102	297,376	313,568	69,543	836,209	44,578	1,561,274	568,828	2,668*	74,000	492,160	228,774
Colorado & Southern	1,251	484,285	111,780	630,402	101,236	117,829	15,687	200,414	21,415	456,581	173,821	1,170*	21,025	151,626	36,831
Delaware & Hudson	845	1,475,511	200,027	1,721,789	133,634	244,473	19,750	556,170	38,860	992,887	728,902	364*	35,000	693,538	212,221
Delaware, Lackawanna & Western	893	2,057,623	573,571	2,819,060	374,294	388,574	59,259	736,487	48,404	1,607,018	1,212,042	29,312	98,400	1,142,954	†19,648
Denver & Rio Grande	2,516	1,269,451	381,685	1,726,852	279,229	303,664	39,144	611,015	40,182	1,273,234	453,618	1,406	59,000	396,024	†83,937
El Paso & Southwestern Co	867	518,593	88,554	632,252	85,052	77,794	9,104	174,423	25,645	372,018	260,234	1,782*	17,167	241,285	98,341
Erie	1,901	2,705,151	682,720	3,654,409	256,807	735,729	91,527	1,175,780	82,708	2,342,551	1,311,858	26,125	119,780	1,218,203	190,468
Great Northern	6,960	3,133,671	874,231	4,273,552	1,124,870	462,163	70,091	1,224,903	84,884	2,966,911	1,306,641	16,496	208,429	1,114,708	401,805
Gulf, Colorado & Santa Fe	1,518	533,968	221,356	815,673	206,535	144,784	21,551	370,556	28,463	771,889	43,784	.....	32,649	11,135	53,014
Kansas City Southern	827	582,297	109,271	762,609	87,077	81,153	25,145	243,761	27,429	464,565	298,044	.....	25,344	272,700	108,096
Lake Shore & Michigan Southern	1,511	2,303,089	728,450	3,472,216	526,358	506,465	89,191	1,054,857	53,729	2,230,601	1,241,615	8,407*	125,000	1,108,208	369,409
Lehigh Valley	1,451	2,397,493	329,688	2,830,345	280,980	471,838	71,814	796,013	61,918	1,682,563	1,147,782	16,744*	94,600	1,036,438	†228,405
Louisville & Nashville	4,388	2,581,570	807,512	3,647,894	498,947	631,253	83,363	1,178,762	72,915	2,465,240	1,182,654	3,532*	170,475	1,008,647	333,656
Michigan Central	1,746	1,475,498	498,045	2,164,970	289,627	321,018	63,204	811,670	36,158	1,521,677	643,293	7,505*	94,000	541,788	62,231
Missouri, Kansas & Texas	3,072	1,145,914	512,676	1,790,523	234,082	101,708	47,806	766,967	71,706	1,222,269	568,254	3,628*	45,072	519,554	353,907
Mobile & Ohio	1,098	540,771	101,136	756,803	100,164	70,893	26,911	273,441	30,324	501,733	255,070	3,172*	26,000	225,898	97,594
New York Central & Hudson River	3,587	4,322,590	2,252,504	7,348,336	1,030,049	1,259,729	155,527	2,552,458	167,047	5,164,810	2,183,526	8,062	361,435	1,830,153	614,739
New York, New Haven & Hartford	1,998	2,370,384	1,954,455	4,761,765	609,799	482,294	26,399	1,789,017	97,614	3,005,123	1,756,642	87,803	285,000	1,559,445	886,640
Norfolk & Western	1,930	2,130,949	307,932	2,521,668	357,458	383,660	43,428	689,772	55,362	1,529,680	991,988	3,389*	82,300	906,299	217,320
Pennsylvania Company	1,416	2,881,208	540,084	3,748,944	450,874	523,584	63,840	1,168,562	68,171	2,275,031	1,473,913	219*	149,900	1,323,794	367,587
Pennsylvania R. R. Co	4,048	8,439,420	2,446,757	11,676,261	1,554,821	1,980,851	152,561	3,808,463	289,875	7,786,571	3,889,690	133,210*	239,161	3,517,319	447,918
Pere Marquette	2,341	810,222	252,839	1,147,004	137,106	132,893	32,294	467,605	30,042	799,940	347,064	3,159*	41,720	302,185	142,130
Philadelphia, Baltimore & Washington	716	757,236	612,643	1,544,187	210,003	234,886	23,004	587,505	27,905	1,083,303	460,884	.....	37,435	423,449	112,515
Pittsburgh, Cin., Chic. & St. Louis	1,472	1,869,546	549,049	2,759,393	384,259	455,799	57,697	947,948	55,026	1,900,729	858,664	849*	114,010	743,805	96,596
Seaboard Air Line	2,603	974,557	279,764	1,398,457	220,978	201,192	47,973	441,000	46,171	957,314	441,143	295*	54,053	386,794	194,900
Southern Ry.	7,050	2,595,325	1,085,273	4,033,898	457,236	636,940	107,394	1,454,844	150,968	2,807,382	1,226,516	20,927	160,677	1,086,766	189,176
Vandalia	829	455,538	171,630	708,284	138,584	119,391	21,976	264,198	17,645	561,794	146,490	.....	23,243	123,247	19,925
ELEVEN MONTHS OF FISCAL YEAR.															
Atchison, Topeka & Santa Fe	7,458	47,529,018	16,901,755	70,088,946	8,994,721	10,591,093	1,436,739	18,994,804	1,450,371	41,467,728	28,621,218	.....	2,326,798	26,294,420	3,739,918
Atlantic Coast Line	4,469	16,919,262	5,401,030	24,111,047	3,276,185	3,327,675	391,645	7,827,868	678,044	15,501,417	8,609,630	.....	1,016,027	7,593,603	2,040,607
Boston & Maine	2,242	21,025,757	12,287,403	36,079,825	3,841,213	4,292,833	452,424	16,216,211	871,001	25,673,682	10,406,143	88,418	1,631,947	8,862,614	1,120,930
Central of New Jersey	668	15,229,046	3,886,771	20,213,148	1,942,946	3,372,051	277,062	5,468,470	419,886	11,480,415	8,732,733	233,164	901,488	8,064,409	9,818
Chesapeake & Ohio	1,896	19,064,516	4,077,807	24,213,125	2,755,636	4,542,204	414,132	6,717,235	476,304	14,905,511	9,307,614	32,895*	734,500	8,540,219	1,233,780
Chicago & North Western	7,634	39,879,014	15,385,279	60,306,934	7,352,964	7,101,902	1,028,387	22,676,883	1,027,429	39,187,565	21,119,369	672*	2,485,000	18,633,697	1,369,541
Chicago, Burlington & Quincy	9,023	48,146,722	17,850,075	72,185,863	11,326,421	12,162,093	1,411,814	22,581,365	1,899,461	49,381,154	22,804,709	142,614*	2,338,600	20,323,495	1,227,187
Chicago, Rock Island & Pacific	7,414	33,726,846	15,273,626	52,231,369	7,692,229	6,587,187	1,240,946	19,735,821	1,413,145	36,689,328	15,542,041	130,092*	1,993,016	13,418,933	1,308,392
Chicago, St. Paul., Minn. & Omaha	1,739	7,882,853	3,656,426	12,380,911	1,429,489	1,400,554	240,773	4,621,575	316,745	8,009,136	4,371,775	1,337*	582,857	3,787,581	340,579
Cleve., Cin., Chic. & St. Louis	1,982	15,260,141	6,238,799	23,777,005	2,662,442	4,210,781	765,626	9,494,614	484,492	17,617,955	6,159,050	38,833*	781,348	5,338,869	842,769
Colorado & Southern	1,251	6,049,946	1,339,061	7,804,880	1,003,977	1,443,439	155,343	2,416,135	275,279	5,294,173	2,510,707	2,428*	230,235	2,278,044	†5,453
Delaware & Hudson	845	14,350,559	2,486,643	17,362,206	1,249,657	2,039,446	197,306	6,146,123	431,510	10,064,042	7,298,164	1,856*	381,749	6,914,559	†250,675
Delaware, Lackawanna & Western	893	22,734,650	6,033,885	30,670,483	3,023,375	4,207,162	550,516	8,484,188	597,758	16,862,999	13,807,484	277,869	996,000	13,089,353	1,073,133
Denver & Rio Grande	2,516	13,781,724	4,364,752	18,995,804	2,233,561	3,271,545	421,501	6,696,477	541,462	13,164,546	5,831,258	38,441	704,750	5,164,949	†959,208
El Paso & Southwestern Co	867	5,455,496	897,476	6,645,602	791,635	876,656	103,452	1,814,054	268,101	3,853,898	2,791,704	16,155*	177,376	2,598,173	507,154
Erie	1,901	29,284,759	7,396,530	39,472,435	3,604,197	7,922,566	887,594	13,459,986	871,849	26,746,192	12,726,243	243,048	1,132,457	11,836,834	3,766,021
Great Northern	6,960	36,135,972	9,865,858	48,904,711	8,755,179	5,884,293	662,656	13,657,192	924,558	29,833,878	19,070,833	194,171	2,295,770	16,969,234	949,091
Gulf, Colorado & Santa Fe	1,518	8,412,529	2,664,404	11,701,443	1,887,618	1,822,024	225,218	4,211,330	342,695	8,488,885	3,212,558	.....	312,921	2,899,638	1,713,019
Kansas City Southern	827	6,075,577	1,196,677	8,019,224	875,984	917,968	245,511	2,551,784	302,276	4,893,523	3,125,701	.....	296,935	2,828,766	286,104
Lake Shore & Michigan Southern	1,511	24,557,657	8,561,738	37,836,900	4,491,019	5,695,913	909,841	12,132,961	634,759	23,864,493	13,972,407	43,454*	1,398,646	12,530,307	928,469
Lehigh Valley	1,451	25,666,036	3,536,993	30,211,292	3,159,853	5,391,608	729,857	9,135,563	603,420	19,020,301	11,190,991	107,374*	1,004,600	10,079,017	†744,382
Louisville & Nashville	4,388	29,996,146	9,240,136	41,898,183	4,803,575	7,358,709	921,944	13,440,683	855,548	27,380,459	14,517,724	94,824*	1,295,300	13,127,600	4,467,488
Michigan Central	1,746	15,561,062	5,672,519	23,304,547	2,768,643	3,319,076	662,263	9,008,365	386,762	16,145,109	7,159,438	58,492*	1,035,694	6,065,252	†389,148
Missouri, Kansas & Texas	3,072	15,677,267	6,373,358	23,410,044	3,135,269	3,164,838	534,129	8,761,479	764,783	16,360,498	7,049,546	12,361*	967,040	6,070,145	110,253
Mobile & Ohio	1,098	6,573,922	1,113,131	8,941,995	1,008,741	1,389,823	305,332	3,084,775	327,223	6,115,894	2,826,101	25,316*	214,500	2,586,285	211,189
New York Central & Hudson River	3,587	46,581,605	24,784,535	79,748,616	9,407,412	13,946,532	1,914,736	29,652,863	1,838,600	56,760,143	22,988,473	122,036	4,164,462	18,946,047	2,542,630
New York, New Haven & Hartford	1,998	24,188,558	20,875,314	49,520,363	5,862,384	5,781,943	267,913	20,560,765	1,032,877	33,505,882	16,014,481	1,102,014	3,187,000	13,929,495	2,025,066
Norfolk & Western	1,930	22,495,503	3,194,598	26,581,651	2,979,614	4,467,180	441,819	7,633,190	583,522	16,105,325	10,476,326	9,550*	926,500	9,540,275	1,133,061
Pennsylvania Company	1,416	28,039,808	6,107,576	37,465,559	3,997,632	6,039,482	684,665	12,885,291	776,414	24,383,484	13,082,075	30,182*	1,665,498	11,386,395	662,049
Pennsylvania R. R. Co	4,048	91,477,970	26,266,718	126,212,524	14,890,762	25,139,123	1,674,806	44,163,782	3,140,128	89,008,601	37,203,923	245,062*	2,112,197	34,846,664	†505,155
Pere Marquette	2,341	8,935,243	3,048,852	12,973,886	1,504,488	1,862,689	308,488	5,237,919	326,840	9,240,424	3,733,462	5,470*	534,983	3,193,009	719,465
Philadelphia, Baltimore & Washington	716	7,293,294	6,343,042	15,332,416	1,971,478	2,657,280	243,328	6,312,164	328,343	11,512,593	3,819,823	.....	361,438	3,458,385	235,909
Pittsburgh, Cin., Chic. & St. Louis	1,472	20,175,427	6,255,944	29,893,433	3,576,262	5,248,412	674,214	10,517,356	611,789	20,628,033	9,265,400	6,028*	1,305,765	7,953,607	290,055
Seaboard Air Line	2,603	10,466,360	3,230,711	15,161,167	2,178,336	2,182,820	535,460	5,132,673	516,702	10,545,991	4,615,176	10,591*	569,713	4,034,872	1,135,942
Southern Ry.	7,050	31,830,804	12,380,273	48,135,520	5,606,159	7,532,655	1,128,521	16,879,830	1,599,434	32,746,599	15,388,921	134,704	1,757,884	13,765,741	3,690,572
Vandalia	829	5,160,700	1,990,363	8,064,739	1,211,134	1,343,550	233,068	3,106,739	188,312	6,082,803	1,981,936	.....	273,773	1,708,163	†53,289

*Deficit. †Decrease.

Contract for Lower Than Published Rate.

Ames Brooks Co. v. Rutland Railroad Company et al. Opinion by Commissioner Prouty.

A tariff fixing a rate on ex-lake grain for export from Ogdensburg, N. Y., to Boston, Mass., having been legally established, it was the duty of the defendants to apply the rate so published and in effect on a shipment made by complainant between those points; and if, as claimed by complainant, a contract was made with defendants for a lower charge on that shipment, such contract was not binding, and its violation furnishes no ground for redress under the act to regulate commerce.

Discrimination Against Negroes.

Wesley J. Gaines et al. v. Seaboard Air Line et al. Opinion by Commissioner Cockrell.

Certain bishops of the African Methodist Episcopal Church alleged that the day coaches furnished for colored passengers in the southeastern states are not equal to those provided for white people; that negroes are denied sleeping-car accommodations, and are refused food in the dining cars solely on account of their race and color. The complaint with respect to the day coaches was abandoned in view of the great weight of the evidence to the contrary, and with respect to eating accommodations was materially modified by concession; most of the complainants and their witnesses testified that they do ride on the sleeping cars; that undue discrimination or prejudice has not been shown and that the complaint should be dismissed.

A Carrier as Shipper.

Hitchman Coal & Coke Co. v. Baltimore & Ohio et al. Opinion by Commissioner Clark.

Coal mines in Ohio, West Virginia and Pennsylvania are, for rate-making purposes, arranged in groups. The Ohio river is, and for a long time has been, the boundary line between certain of these groups lying east and west thereof. Complainant's mine is on the east bank of the Ohio river. The rates for transportation of its product are higher to points west of the Ohio river than from the mines on the west bank of that river, and are lower to points east of the Ohio river than from the mines on the west bank of the river. The larger part of the complainant's coal is being sold to the Baltimore & Ohio and, as the property of the B. & O., has been given a lower rate in the past.

The custom has been somewhat general in years gone by for carriers to accord to each other preferential rates lower than were charged for the same service to the shipping public. There is, however, no warrant in the common law for the theory that a carrier as a shipper over the lines of another carrier may enjoy or be given a preferred status. There is no intimation in the act to regulate commerce that a carrier as a shipper has or may be given a status that is different from or more advantageous than that given to all other shippers. The practice cannot be upheld without removing the very corner stone of the act, which seeks to abolish discrimination and preference. The commission adheres to the view that it is the law that a carrier as a shipper over the lines of another carrier may not lawfully be given any preference in the application of tariff rates on interstate shipments. If carriers insist on making or maintaining such preferential rates they may confidently expect that such voluntary action on their part will be accepted and taken as evidence of the unreasonableness of higher rates which they may undertake to enforce against other shippers.

Complainant alleges that this arrangement is unreasonable and unjust to it, and prays that it be included in the group with the mines on the west side of the river. The conditions are not the same on both sides of the river, and no showing is made which would warrant compulsory change in the grouping as prayed for, which would in all probability involve all the rate adjustments from the bituminous coal fields of the states of Ohio, Pennsylvania and West Virginia. Complaint dismissed.

STATE COMMISSIONS.

The Railroad Commission of Louisiana has issued an order for the reduction of rates on soda water, mineral waters, hops, coca-cola and all carbonated non-alcoholic drinks.

The Railroad Commission of Louisiana has ordered that express companies in that state shall not after July 15 charge more than one and one-half times the merchandise rate on standard bred poultry intended for exhibition at fairs and expositions.

The New York Public Service Commission, Second district, has determined that it has the power to change the rate of fare now charged by the Ticonderoga Railroad if it is found to be unjust notwithstanding the fact that the rate now being charged was fixed by special act of the legislature.

The Indiana Railroad Commission has issued an order requiring the Evansville, Suburban & Newburg and the Evansville Terminal to establish physical connection at Newburg and maintain freight interchange relations after August 15. These roads are operated by both electricity and steam power.

The New York Public Service Commission, Second district, has dismissed the complaint of the village of Newark against the New York Central & Hudson River as to the smoke nuisance of the West Shore pumping station at that place, the company having substituted hard coal instead of soft as formerly used.

The State Corporation Commission of Oklahoma has issued an order that hereafter in fixing rates the lines of the Chicago, Rock Island & Pacific and the St. Louis & San Francisco shall be considered as one line. In fixing rates on state traffic the commission has heretofore made somewhat higher rates for hauls over two lines than for an equal length over one road. The effect of this order will be to reduce the legal joint rates of these roads.

COURT NEWS.

Judge A. B. Anderson, of the Federal court at Indianapolis, has ruled against the railway commission and in favor of the Vandalia on complaint against an order made by the commission prohibiting the company from charging, for the transportation of classified freight between Indianapolis and the Illinois state line, and all intermediate points on the road, rates in excess of those designated in the order of the commission. The railway complained on the ground that the rates provided for would not be sufficient to pay operating expenses. The commission has not decided what step will next be taken, but there is a disposition to appeal the case to the Supreme Court of the United States.

The suit of the federal government looking to the dissolution of illegal coal trusts is still alive, and testimony was taken in New York last week. E. B. Thomas, president of the Lehigh Valley, and formerly president of the Erie, testified concerning the relations between those roads and the other roads interested in anthracite coal. There is not and never has been any agreement which would prevent competition. In 1896 the presidents met and attempted to agree upon a percentage basis for the distribution of cars, but the plan was never carried out because they could not agree. No reference was made at the meeting to curtailment of production and no attempt was made to have a fixed value placed on anthracite coal. In 1903 the Lehigh Valley carried considerably more coal than the percentage which had been allotted to it under the tentative plans which were considered in 1896. The purchase of the Pennsylvania Coal Co. by the Erie Railroad was effected while Mr. Thomas was president of the road, and he says that making that purchase was the best thing that he ever did for the company. As to the relations of the Erie with the Temple Iron Co., Mr. Thomas said that the only object in entering that company was to preserve the road's tonnage. W. H. Truesdale, president of the Delaware, Lackawanna & Western, also testified concerning the discussions which had taken place among the presidents concerning coal rates, and said that the only result was "a general knowledge by the different roads of what the others were going to do."

Railroad Officers.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Edward L. Covert has been appointed chief claim agent, in charge of personal injury claims, of the Pennsylvania Lines West, with office at Pittsburgh, Pa.

S. L. Kamps, assistant to the chief executive officer of the Seaboard Air Line, has been appointed the assistant to the agent for receivers, with office at Portsmouth, Va.

L. E. Kelley, treasurer of the Toledo & Ohio Central and the Kanawha & Michigan, has resigned as treasurer of the Kanawha & Michigan and has been elected treasurer of the Zanesville & Western. See Toledo & Ohio Central in Railroad Financial News.

G. P. Ranney has been elected treasurer of the Montana Railroad, with office at Chicago, succeeding T. A. Mapes, resigned. Drafts in settlement of any accounts such as interline freight, passenger or car mileage balances, etc., should be drawn on and remittances made to the treasurer at Chicago. W. N. D. Winne has been appointed general auditor, with office at Chicago. J. Welch, auditor, with office at Helena, Mont., has resigned.

Charles T. Lewis, second vice-president of the Toledo & Ohio Central and the Kanawha & Michigan, has been elected the president of the Toledo & Ohio Central and the Zanesville & Western, with headquarters at Toledo, Ohio, succeeding Nicholas Monsarrat, resigned. C. G. Hickox, first vice-president of the Toledo & Ohio Central, has been elected also vice-president of the Zanesville & Western, with office at Toledo, Ohio. See Toledo & Ohio Central in Railroad Financial News.

Blewett Lee, whose appointment as the general solicitor of the Illinois Central, with office at Chicago, has been announced in these columns, was born on March 1, 1876, near Columbus, Miss. He received his education at the Agricultural and Mechanical College of Mississippi, 1880-1883; the University of Virginia, 1883-1885; Harvard University, 1885-1888, and at Leipsic and Freiburg, Germany, 1888-1889. On January 1, 1902, he became general attorney of the Illinois Central, and held this office until his appointment on June 15, 1909, as the general solicitor.

Frank M. Whitaker, freight traffic manager of the Chesapeake & Ohio, has been elected vice-president and traffic manager, as previously announced in these columns. He was born on September 7, 1867, in Clermont county, Ohio. He received his education in the public schools and began railway work in September, 1882, in the office of the division freight agent of the Pennsylvania Lines West at Cincinnati, Ohio. Three years later he was appointed chief clerk to the general agent of the Chesapeake & Ohio at Cincinnati. In 1889 he became chief clerk to the manager of the Kanawha Despatch, and in 1892 was appointed manager. He went to the Chesapeake & Ohio in 1896 as assistant freight traffic manager, and was made freight traffic manager in 1899, which position he held until his election as vice-president and traffic manager.

Operating Officers.

A. C. Ridgway, the general manager of the Denver & Rio Grande at Denver, Colo., has resigned.

W. E. Beecham has been appointed car accountant of the Montana Railroad, with office at Chicago.

G. R. Wansborough, general freight and passenger agent of the Beaumont & Great Northern, has been appointed the general manager of the Houston, Fostoria & Northern.

H. E. Speaks, the superintendent of the Hocking Valley, has been appointed the superintendent of the Toledo & Ohio Central and the Zanesville & Western, with office at Toledo, Ohio. See Toledo & Ohio Central in Railroad Financial News.

R. H. Ingram has been appointed assistant general manager of the Southern Pacific of Mexico, with office at Empalme, Sonora, Mexico. All other officers of the Cananea, Yaqui River & Pacific and of the Navojoa to Guadalajara assume similar service of the Southern Pacific of Mexico.

G. Van Tassel, superintendent of the Harlem division of the New York Central & Hudson River, has had his authority extended over the Putnam division from Brewster to 155th street, Manhattan.

George R. Huntington, the general superintendent of the Minneapolis, St. Paul & Sault Ste. Marie, has been elected the general manager, with office at Minneapolis, succeeding E. Pennington, who some time ago was elected president.

Thomas M. Connors, superintendent of the Kanawha & Michigan, with office at Charleston, W. Va., has been appointed the superintendent of the Hocking Valley, succeeding H. E. Speaks at Columbus, Ohio, resigned to go to another company.

A. C. Ridgway, general manager of the Denver & Rio Grande, with office at Denver, Colo., and W. D. Lee, superintendent of the Fourth division, with office at Alamosa, Colo., have retired to go into private business. Vice-President Charles H. Schlacks, at Denver, will in future assume also the duties of general manager.

The Hine system of organization has been adopted on the Victoria division of the Galveston, Harrisburg & San Antonio, and the titles of master mechanic and resident engineer have been abolished. The following have been appointed assistant superintendents with offices at Victoria, Texas: P. B. McNeal, formerly assistant superintendent; E. Verhelle, formerly master mechanic; and E. J. Nichols, formerly resident engineer.

E. H. Barrett has been appointed the superintendent, J. E. Hood the trainmaster, and W. C. Stephens the chief despatcher of the Missoula division of the Chicago, Milwaukee & Puget Sound, with offices at Alberton, Mont. This division will extend from Deer Lodge, Mont., to North Fork, Idaho. C. H. Marshall has been appointed the superintendent, A. H. Moll the trainmaster and W. J. Splon the chief despatcher of the Columbia division, with offices at Malden, Wash. This division will extend from North Fork, Idaho, to Clealum, Wash. P. C. Hart has been appointed the superintendent, F. E. Willard the trainmaster and E. G. Fowler the chief despatcher of the Coast division, with offices at Tacoma, Wash. This division will extend from Clealum to Seattle and Tacoma.

Traffic Officers.

G. A. Perry has been appointed a traveling freight agent of the Southern Railway, with office at Indianapolis, Ind.

O. G. Parsley, formerly general agent of the Kansas City Southern at Chicago, has been appointed the general agent of the Missouri, Oklahoma & Gulf at Chicago.

J. W. White, general industrial agent of the Seaboard Air Line at Portsmouth, Va., has been transferred to Norfolk, Va., and will in future report to C. R. Capps, freight traffic manager.

W. H. Druso has been appointed a traveling freight agent of the New York, Chicago & St. Louis, with office at Fort Wayne, Ind., succeeding W. A. Frey, resigned to go with another road.

R. W. Courts, a contracting freight agent of the Illinois Central at Atlanta, Ga., has been appointed a traveling freight agent. H. L. Collins succeeds Mr. Courts as contracting freight agent.

J. E. Allen, assistant general freight agent of the St. Louis Southwestern of Texas, has been appointed an assistant general freight agent of the St. Louis Southwestern, with office at St. Louis, Mo.

Hudson Fitch, traffic manager of the Toledo & Ohio Central, has been appointed traffic manager also of the Zanesville & Western, with office at Toledo, Ohio. See Toledo & Ohio Central in Railroad Financial News.

W. A. Frey, traveling freight agent of the New York, Chicago & St. Louis at Fort Wayne, Ind., has been appointed a

traveling freight agent of the Delaware, Lackawanna & Western, with office at Binghamton, N. Y.

J. L. Durrett, commercial agent of the Illinois Central at Nashville, Tenn., has been transferred to Jacksonville, Fla., and W. B. Ryan, traveling freight agent at Memphis, Tenn., has been transferred to Jacksonville, Fla.

Albert G. Bantley, soliciting freight agent of the Chicago, Milwaukee & St. Paul, at Milwaukee, Wis., has been appointed a traveling freight and passenger agent of the Chicago, Milwaukee & Puget Sound at Tacoma, Wash.

P. B. Doddridge, recently resigned as traveling freight agent of the Southern Railway, has been appointed a contracting agent in the freight traffic department of the Missouri Pacific and St. Louis, Iron Mountain & Southern, with office at St. Louis, Mo.

Frank P. Redman, traveling freight agent of the Yazoo & Mississippi Valley at Memphis, Tenn., has been appointed the commercial agent of the Illinois Central at Memphis, Tenn., succeeding J. L. Durrett, promoted. George T. Hayes succeeds Mr. Redman.

A. E. Buck, traveling freight agent of the International & Great Northern, at Houston, Texas, has been appointed the general freight and passenger agent of the Beaumont & Great Northern, with office at Beaumont, Texas, succeeding G. R. Wansborough, resigned to go with another road. L. R. Dallam succeeds Mr. Buck.

John C. Earls, freight solicitor of the Pennsylvania at Buffalo, N. Y., has been appointed a freight solicitor of the Northern Central, with office at Rochester, N. Y. W. S. Franklin, Jr., has been appointed a freight solicitor of the Northern Central and the Philadelphia, Baltimore & Washington, with office at Baltimore, Md.

J. H. Crawford, general freight agent of the Delaware, Lackawanna & Western at New York, has been appointed the assistant freight traffic manager, with office at New York. Nat Duke, general eastern freight agent at New York, succeeds Mr. Crawford. Charles F. McTague, commercial agent at Cleveland, Ohio, succeeds Mr. Duke, with office at New York.

H. P. Dunbar has been appointed a freight solicitor of the Pennsylvania, with office at Buffalo, N. Y., succeeding J. C. Earls, transferred. Edward S. Neilson has been appointed a freight solicitor, with office at New Haven, Conn. J. H. Cross has been appointed a freight solicitor, with office at Newark, N. J. J. H. Neeld has been appointed a freight solicitor, with office at Erie, Pa.

L. E. Chalenor, assistant general freight agent of the Seaboard Air Line at Norfolk, Va., has been appointed the general freight agent, with office at Norfolk, succeeding C. R. Capps, promoted. R. I. Cheatham, assistant general freight agent at Norfolk, has been appointed the first assistant general freight agent, and G. S. Rains has been appointed assistant general freight agent, with office at Norfolk. The first assistant general freight agent and assistant general freight agent will report to the general freight agent.

H. S. Stebbins, general eastern freight agent of the Erie at New York, has been appointed a division freight agent, with office at Rochester, N. Y., succeeding A. M. Chamberlain, resigned; W. S. Cowie, assistant general freight agent, succeeds Mr. Stebbins, with office at New York; H. Wilson, division freight agent at Youngstown, Ohio, succeeds Mr. Cowie, with office at New York; J. C. Flood, commercial agent at Cleveland, succeeds Mr. Wilson, with office at Youngstown; L. H. Geller succeeds Mr. Flood, with office at Cleveland; F. H. Dowle has been appointed a commercial agent, with office at Detroit, Mich.

Ira W. Gantt, whose appointment as assistant general freight agent of the Grand Trunk, with office at Buffalo, N. Y., was recently announced in these columns, was born at Atkinson, Henry county, Ill., November 28, 1857. He was educated in the public schools and began railway work in 1882 as agent at Peoria, Ill., for the Great Eastern Fast Freight Line, and about four years later became agent at Chicago. In March, 1901, he went to the Central Vermont as general freight agent at St. Albans, Vt., and about a year later was appointed manager of the Grand Trunk Despatch and Milwaukee & Michigan Fast Freight Line, and also division freight agent of the Grand Trunk at Detroit, Mich. In August, 1903, he was made division freight agent of the Grand Trunk at Toledo, Ohio, and early in 1908 was appointed also manager of the Lackawanna Grand Trunk Line, which position he held until his recent appointment as assistant general freight agent.

Engineering and Rolling Stock Officers.

Hugh D. Lumsden, chief engineer of the commissioners of the Trans-Continental Railway, with office at Ottawa, Ont., has tendered his resignation.

W. H. Petersen, bridge engineer of the Chicago, Rock Island & Pacific, with office at Chicago, has been appointed the principal assistant engineer, with office at Chicago.

C. F. Richardson has been appointed the assistant to the superintendent of motive power of the Chicago, Rock Island & Pacific, in charge of fuel economy, with headquarters at Chicago.

G. D. Brooke, assistant division engineer of the Baltimore & Ohio, with office at Pittsburg, Pa., has been appointed a division engineer, with office at Baltimore, Md., succeeding William Trapnell, resigned.

Guy Harvey, assistant engineer of the Eastern division of the Toledo & Ohio Central, with office at Bucyrus, Ohio, has been appointed assistant engineer of the Western division, with office at Columbus, Ohio. He is succeeded by Robert Miller.

S. S. Stiffey, the general superintendent of motive power of the Toledo & Ohio Central, the Hocking Valley and the Zanesville & Western, has resigned as the general superintendent of motive power of the Hocking Valley. See Toledo & Ohio Central in Railroad Financial News.

H. S. Wall, the master mechanic of the Arizona division, Atchison, Topeka & Santa Fe Coast lines, with office at Needles, Ariz., has been appointed the superintendent of shops at San Bernardino, with jurisdiction over all mechanical department facilities excepting the roundhouse. L. A. Mattimore succeeds Mr. Wall.

W. E. Ballantine, chief electrician of the Chicago, Rock Island & Pacific, will work in future under the jurisdiction of the mechanical department officials, and, subject to their approval, will have charge of car and engine electric lighting and will give such assistance with regard to electric appliances for shop use as may be required. The electric lighting at all points on this road where the current is supplied by mechanical department facilities will be under the direct supervision of the mechanical department. At other points the electric lighting will be under the supervision of the superintendent of telegraph.

OBITUARY.

W. J. Mellor, superintendent of bridges and buildings of Morgan's Louisiana & Texas for about 11 years, died recently of cerebral trouble at the age of 48. Mr. Mellor had been with the Southern Pacific system for 20 years.

Col. Atilla Cox, president of the Louisville, Henderson & St. Louis (the Henderson Route), a director of the Louisville & Nashville and chairman of the board of directors of the Columbia Finance & Trust Co. of Louisville, died at Louisville July 7 after a long illness.

A. Kimball, formerly vice-president of the Chicago, Rock Island & Pacific, died at South Lyndboro, N. H., on June 26, at the age of 87. Mr. Kimball began railway work on the old Mississippi & Missouri, now a part of the Chicago, Rock Island & Pacific, as master mechanic at the Davenport, Iowa, shops in 1856. He still held this position when the road passed into the hands of the Chicago & Rock Island Company, which was succeeded by the Chicago, Rock Island & Pacific. He was subsequently division superintendent, general superintendent, assistant to the president and vice-president. He retired foom active railway service about 10 years ago and spent most of his time after that at South Lyndboro, N. H. He was buried at Davenport, Iowa, on June 28.

Railroad Construction.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—An officer writes that double-tracking work is being pushed at various points between Chicago and Kansas City, Mo., and it is expected to have the entire 458 miles finished by the end of 1911. Double track is already laid as follows: Chicago to Edelstein, 142 miles; Knox, Ill., through Galesbury to Surrey, 12 miles; Smithshire west across the Mississippi river to Wyaconda, Mo., 69 miles; Bucklin to Rothville, 15 miles; Carrollton to Camden, 32 miles, and between Camden and Kansas City, 23 miles. This leaves about 165 miles yet to be constructed. From Edelstein, Ill., to Knox, 35 miles; Surrey to Smithshire, 18 miles; Wyaconda to Bucklin, 70 miles; Rothville to Carrollton, 32 miles, and between Camden and Kansas City, about 10 miles. On the section from Edelstein to Knox the contracts for grading and masonry have been let and work is about to be started. Work is about to be commenced on the gap between Rothville and Carrollton; contracts for half of the work have been let. The grading and masonry for the second track will be finished this year and track laid and ballasted in the early spring. When all the improvements are finished the Santa Fe will have a complete double track from Chicago west to Kansas City, 458 miles, a complete three track line from Kansas City to Emporia, Kan., 128 miles, and a complete double track from Emporia to Mission, 83 miles.

ATLANTA, BIRMINGHAM & ATLANTIC.—According to press reports construction work is to be resumed at once. The plans include finishing the line from Pelham, Ala., to Bessemer, 16 miles, and from Bessemer to Birmingham, 12 miles. Also the completion of the branch from Bessemer to the coal and iron properties of the Birmingham Coal & Iron Company at Mulga and other parts of the Birmingham district. (March 19, p. 651.)

CENTRALIA & SANDOVAL.—Incorporated in Illinois, with $2,500 capital, to build from a point on the Chicago, Burlington & Quincy, a mile and a half north of Centralia, Ill., in Marion county, north to Sandoval, about five miles. The incorporators include J. A. Connell and J. M. Doring, of La Grange; H. Haas, Western Springs; E. D. Noreham, Aurora, and H. W. Weiss, Hinsdale.

CHICAGO, AURORA & DE KALB.—Incorporated in Illinois, with $950,000 capital, to build from Aurora, Ill., in Kane county, northwest to De Kalb, in De Kalb county, about 30 miles. The office of the company is at Aurora. The incorporators include J. H. Bliss, Sugar Grove; F. W. Radlin, Kaneville; F. M. Killian, J. C. Murphy and E. J. Lyon, all of Aurora.

CHICAGO, BURLINGTON & QUINCY.—This company has let a contract to McArthur Bros. for 40 miles of branch construction in Wyoming at a cost of approximately $3,000,000.

CHICAGO, DE KALB & WESTERN.—Incorporated in Illinois, with $25,000 capital and office at Chicago, to build from Chicago west across Illinois to Rock Island, about 160 miles. The incorporators and first board of directors include N. J. Taylor, of Elgin; L. D. Grier, J. F. Pearce, F. W. Krengel and O. F. Cole, all of Chicago.

CLINTON, OKLAHOMA & WESTERN.—According to press reports work is now under way on a connection at Clinton, Okla., with the Chicago, Rock Island & Pacific and the Kansas City, Mexico & Orient. Grading has been finished on ten miles, and track laying is to be started at once on the section between Clinton and Butler. The line is to be continued northwest eventually to Trinidad, Colo., and from Clinton southeast to Lehigh, in all 400 miles. F. L. Adams & Co., contractors, Oklahoma City, Okla. G. V. McClure, chief engineer, Clinton. (May 7, p. 1007.)

DESPLAINS VALLEY.—Incorporated in Illinois, with $10,000 capital, and office at Chicago, to build from a point on the Chicago & North Western near Ravinia southerly, passing through the western part of Chicago to a point in section 19, township 38 north, range 13 east, in Cook county. The incorporators include C. A. Vilas, of Evanston; J. A. Sedley and H. Larimer, of Chicago; A. W. Duncan, Wheaton, and R. G. Allen, Ravenswood.

GRAND JUNCTION & GRAND VALLEY.—According to press reports about 20 miles of interurban line is to be built near Grand Junction, Colo. The promoters propose to take over the property of the Grand Junction Electric Gas & Manufacturing Co., also a street car line. T. E. Curtin, president; C. M. MacNeill, of Colorado Springs, and O. Adams, of Grand Junction, are vice-presidents; F. H. MacMahon, secretary. The directors include S. Penrose, of Colorado Springs; T. V. Stearns and E. A. Sunderlin.

IDAHO NORTHERN RAILROAD.—An officer writes that the company intends to build a number of branch lines north of the present line to reach a number of mines in Idaho. Survey was begun last month for a branch up Beaver creek to the Sunset district; also for a line up the Little North Fork about 15 miles. (April 23, p. 918.)

MISSISSIPPI WESTERN.—According to press reports work will be started this month on this projected line from Meriden, Miss., southwest to Natchez, 165 miles. Surveys made and about 80 per cent. of the rights-of-way secured. R. N. Miller, Hazelhurst, N. C., and C. M. Whitworth, Mendenhall, Miss., may be addressed. (April 9, p. 820.)

NEW YORK CENTRAL & HUDSON RIVER.—At a recent hearing before the New York Public Service Commission, Second district, it was announced that the New York Central & Hudson River would have improvements under way this year to cost $21,488,755. This includes electrification of the lines and station improvements in New York City and vicinity at $8,447,682; Buffalo grade crossing elimination, $1,412,000; Rochester grade crossing improvements, $119,000; electrification between Utica and Syracuse, $130,000; double-tracking on the West Shore between Syracuse and Buffalo, $755,000; Watertown station, $260,000; double-tracking of the Rome, Watertown & Ogdensburg division, between Watertown Junction and Adams, $339,000; automatic signal improvements, $289,000, and equipment and improvements, $3,775,552.

NEW YORK, NEW HAVEN & HARTFORD.—Bids are in for building a section of the New York, Westchester & Boston, from about 174th street, near the N. Y., N. H. & H., through the northern part of the Borough of the Bronx and Mount Vernon to Pelham. (June 18, p. 1329.)

NEW YORK SUBWAYS.—See item on this subject under General News.

NEW YORK, WESTCHESTER & BOSTON.—See New York, New Haven & Hartford.

NORTHWESTERN PACIFIC.—An officer writes that contract has been let and work is under way on 1.65 miles of new broad-gage line, connecting the broad-gage Guerneville Valley branch at Camp Vacation, Cal., with the narrow-gage line at Monte Rio. It is also proposed to make the narrow-gage line standard from Monte Rio to Duncan Mills, about four miles. The work includes a bridge over the Russian river, material for which is on the ground. (June 18, page 1329.)

OKLAHOMA CITY JUNCTION.—An officer writes that work is to be started at once on this terminal and switching line at Oklahoma City, Okla. The work will include building two bridges over the North Canadian river and filling in along the river bottom. T. E. Wilson is president and E. F. Bisbee vice-president, both of Chicago. (July 2, p. 35.)

OREGON EASTERN.—See Southern Pacific.

PACIFIC & EASTERN.—In operation from Medford, Ore., to Eagle Point, 12 miles. Proposed extension to Crater Lake, 60 miles, of which the first 20 miles is now being built to Butte Falls, and it is expected this section will be finished this summer. It is proposed to extend the line 17 miles through the fruit section of Rogue river valley, touching coal mines, thence into the timber section of Jackson and Klamath counties.

PENNSYLVANIA.—An officer sends us information regarding improvements to be made at Northumberland, Pa., as follows: A contract has been recently given by the Pennsylvania and the Northern Central to Eyre & Shoemaker, of Philadelphia, Pa., for the construction of a new classification yard about two miles west of Sunbury. The contract calls for a yard about three miles long to cover an area of about 700 acres. The construction work involves about 3,000,000 cu. yds. of grading, 18,000 cu. yds. of bridge and culvert masonry, 70 miles of new track, and the change in location of one mile and one-half of the public road. There are also to be put

up a 36-stall roundhouse, power house, machine shop, transfer shed and some smaller buildings. The plans provide for east and westbound hump classification yards, a modern water system, lighting and other facilities. It is expected that these improvements will greatly facilitate the movement of traffic through Sunbury, where four divisions of the company's lines now converge. At present the shifting and classifying of cars at Sunbury has to be done on tracks which are crossed at grade by a number of important streets, and the facilities are inadequate and their extension impracticable. The maximum movement at Sunbury has been as high as 4,000 cars a day. The daily average in 1907 was 2,790 cars a day.

Rockland Railroad (Electric).—An officer writes that the projected route is from Tenafly, N. J., northerly through Creskill, Demarest, Closter, Norwood and Northvale to Tappan, N. Y., thence through Sparkill, Piermont, Grand View, South Nyack, Nyack, New City, Congers, Haverstraw and West Haverstraw to Stony Point, about 34 miles, with a branch from Nyack westerly via Nanuet and Spring Valley to Suffern, 14 miles. The estimated cost of the line is $2,500,000. Surveys have been made for a line east of the Sparkill-Tenafly section from Sparkill, N. Y., south to Fort Lee, N. J. This latter does not form a part of the project about to be carried out, but construction will be taken up at a later date. The New York Public Service Commission, Second district, has granted permission to the company to build in Rockland county, and similar action has been taken by the Board of Supervisors of Rockland county. B. A. Hegeman, Jr., Pres.; W. O. Jacquette, V.-Pres.; A. C. Miller, Second V.-Pres. and Genl. Mgr.; S. S. Delano, Treas.; C. J. Hardy, Secy. and Counsel, and W. H. Coverdale, Ch. Engr., 66 Broadway, New York. The directors include H. A. Taylor, E. S. Bayer, F. V. Smith, H. H. Hewitt, K. B. Smith, F. Dickson, M. S. Paine, H. O'Neill and T. Hofstatter.

San Pedro, Los Angeles & Salt Lake.—Surveys are said to be made for an extension of a branch now in operation from Caliente, Nev., north to Pioche towards Panaca and the Ely Valley, about eight miles. It is expected to have the work finished and the line in operation by October.

Shaw & Southwestern.—An officer writes that a charter has been granted in Mississippi to build from Shaw, Miss., in Boliver county, southwesterly through timber lands via Busey to Greenville, Washington county, where connection is to be made with the Delta Southern, a branch of the Southern Railway. Right-of-way has been secured and it is expected to begin work during the early autumn. There will be a small amount of trestle work and one bridge over Bogue Phalia at Busey. J. C. Walker, Pres., Shaw. (June 25, p. 1546.)

Southern Pacific.—According to press reports from Portland, Ore., bids were received recently at the local office for piercing a 5,425-ft. tunnel through the peninsula between the Willamette and Columbia rivers, north of Portland. The improvement is to cost about $1,000,000. The tunnel is to connect the Southern Pacific with the Northern Pacific for the Portland-Seattle service, and is to be used also by the Oregon Railroad & Navigation Co. entering Portland from the east. It is expected that the work will be finished in about one year.

According to press reports bids are being asked for a section of about 60 miles on the Oregon Eastern, building from Natron, Ore., south to Klamath Falls, 152 miles. (March 19, p. 658.)

Sumpter Valley.—An officer writes that surveys have been started for a 20-mile extension out of the John Day valley in Oregon. It is expected to have the work finished this fall. (April 30, page 961.)

Valley Railway.—An officer writes that contracts are to be let within the next 90 days for a line from Houston, Ark., southwest to Perryville, about 10 miles. Address J. E. Rose, Perryville, Ark. (June 25, p. 1546.)

Vera Cruz & Isthmus.—Plans are said to be under way to build branch lines as follows: To the city of Oaxaca, about 125 miles; to the head of navigation on the Papulapam river; to San Adreas Tuxtla in a rich tobacco growing section, and into the Valle Nacional, a productive agricultural section.

West Tulsa Belt.—Incorporated in Oklahoma, with $25,000 capital, to build about five miles of line at a cost of $20,000. The incorporators include W. E. Hawley, H. C. Hall, J. Haver, G. Erick and G. L. Hoonker.

Railroad Financial News.

Atlanta, Birmingham & Atlantic.—The United States Circuit Court has authorized the issue of $3,250,000 two-year receivers' certificates, dated July 1, to bear interest not exceeding 6 per cent. The proceeds of the sale are to be used to complete the road into Birmingham, Ala., and connect the Mulga coal mines with the main line at Bessemer. The receivers, in a letter dated Atlanta, June 26, say that the coupons on series A equipment bonds, due May 1, 1909, have not been paid, but will be paid shortly; and that the coupons on equipment trust bonds, series B, due July 1, will be paid at maturity.

Canadian Northern Ontario.—On June 21 there was offered in London at 92 £800,000 ($4,000,000) 4 per cent. perpetual consolidated debenture stock. The debenture stock will be secured by a first mortgage on a line to be built from an international bridge on the Niagara river over which it will reach Buffalo, to Ottawa, where it will connect with the existing line, and will be secured also on the line already built from Hawkesbury to Ottawa, and will be secured by a general mortgage on the entire property of the company.

Chicago, Burlington & Quincy.—On August 16 the premium of $30, which was offered for an exchange of the Hannibal & St. Joseph 6 per cent. bonds for the C., B. & Q. general mortgage 4 per cent. bonds of 1908-1958 will be reduced to $27.50 per bond. (April 30, p. 961.)

Chicago, Cincinnati & Louisville.—The bondholders' protective committee, S. M. Carter, Chairman, representing the first-mortgage bondholders of the Cincinnati, Richmond & Muncie; the Chicago & Cincinnati, and the Cincinnati & Indiana (underlying bonds of the C., C. & L.) say that three-quarters of the first-mortgage bonds have been deposited under an agreement with H. B. Hollins & Co., New York, and asked for further deposits up to July 20.

Chicago, Peoria & St. Louis.—The United States Circuit Court at Springfield, Ill., appointed John P. Ramsey, president, as receiver and H. M. Merrian, receiver. The application for receivership was made by the trustee of the second mortgage of bonds, interest on which is in default. A security holders' committee consisting of George F. Baker, Jr., Charles H. Warren, Alfred Shepard and W. W. Stevenson, secretary, 34 Nassau street, New York, asks the deposit of consolidated mortgage bonds and other securities of the Chicago, Peoria & St. Louis with the Bankers' Trust Co., New York. The interest coupons of the consolidated mortgage bonds, due January 1, 1909, have not been paid, nor have those due July 1 been paid.

Chicago, Lake Shore & Eastern.—This company has increased its capital stock from $2,760,000 to $9,000,000.

Delaware, Lackawanna & Western.—A cash dividend of 50 per cent., payable July 20 to holders of stock on July 1, calling for payment of $13,100,000, has been declared, and a stock dividend of 15 per cent., payable August 2 to holders of stock July 15, has also been declared. A stockholders' meeting has been called for July 20 to authorize an increase of the capital stock from $26,200,000 to $30,277,000. This is an increase of $4,077,000, of which the stock dividend will take $3,930,000. The directors have authorized the officers to make a contract with the Delaware, Lackawanna & Western Coal Co. to sell all coal of the company at its mines within the state of Pennsylvania. An official statement says:

"It was the judgment of the board that the earnings of the company have been such as to fairly entitle the stockholders to the increased cash dividend, and that there was no necessity at the present time of adding such earnings to the surplus of the company. It was also thought that funds should be available to the stockholders to enable them, if they so desired, to subscribe to the stock of a coal company which, it was expected, would be organized and would take over the business of the coal sales department of the railway company.

"The increase in stock resulted from the merger of two corporations into the Delaware, Lackawanna & Western,

namely, the Bangor & Portland and the Hanover & Newport, the capital stock of which was held by the D. L. & W. Also, because of recent payments by the company of outstanding bonds, used in construction of the railway, which, in the opinion of the board, ought fairly to be represented in the capital stock of the company.

"The decision of the board to sell all the coal of the railway company within the state of Pennsylvania to another company conforms to the decree of the Supreme Court in the so-called commodities case, which necessitated such action. The proposed contract for sale provides that the buyer will purchase all of the coal of the railway company in transit and stored at various points at its actual market value and the future entire output of coal of the railway company on the basis of the 65 per cent. contract. Under the terms of such forms of contract, the railway company sells its coal at the mines for 65 per cent. of the market value of such coal at the time of sale, as determined by the New York tidewater price. The buyer, in addition to paying such price for the coal, assumes all transportation charges from the mines.

"Certain individual stockholders of the railway company have organized a coal company, which was incorporated under the laws of New Jersey, under the name of the Delaware, Lackawanna & Western Coal Co. It is capitalized at $6,800,000, and all the stockholders of the railway company will be invited to subscribe to the stock of the coal sales company on the basis of one share of stock of the coal sales company for each four shares of stock held by them respectively in the railway company. It is expected that a large majority of the stockholders will so subscribe. The directors of the coal sales company are George F. Baker, Jr., Percy R. Pyne 2d, James A. Stillman, Edward E. Loomis, William H. Truesdale, George H. Gardiner and Henry R. Taylor. The president is Edward E. Loomis; vice-president, Daniel E. Russell, and secretary and treasurer, J. J. A. Owens."

ERIE.—E. H. Gary, chairman of the United States Steel Corporation; George W. Perkins, of the firm of J. P. Morgan & Co.; R. S. Lovett, vice-president and general counsel of the Union Pacific, and L. F. Loree, president of the Delaware & Hudson, have been elected directors of the Erie, succeeding Alexander E. Orr, Lewis L. Stanton and William C. Lane, resigned, and to fill a vacancy.

FLORIDA EAST COAST.—J. P. Morgan & Co., the First National Bank and the National City Bank, all of New York, are offering at 102½ the unsold portion of $10,000,000 first mortgage 4½ per cent. bonds of 1909-1959. Of the total authorized issue of $12,000,000, $2,000,000 are reserved for various purposes. It is estimated that the property has cost over $33,000,000 in cash and $4,000,000 additional common stock is to be bought at par by Henry M. Flagler, President, to provide funds for the completion of the extension to Key West.

GRAY'S PEEK SCENIC DEVELOPMENT CO.—This company, incorporated with $300,000 capital stock, took over on June 17 the management of the property of the Argentine Central, having acquired $300,000 of a total of $500,000 capital stock. The $200,000 bonds of the Argentine Central remain outstanding.

GULF & SHIP ISLAND.—A dividend of 4 per cent., which was deferred in 1908, has been declared payable in July. This makes 4 per cent. paid annually since April, 1903.

HOCKING VALLEY.—See Toledo & Ohio Central.

KANAWHA & MICHIGAN.—See Toledo & Ohio Central.

KANSAS CITY SOUTHERN.—Stockholders have ratified the issue of $21,000,000 refunding and improvement bonds and the sale of $10,000,000 of these bonds to Ladenburg, Thalmann & Co., New York. (June 11, p. 1230.)

LOUISVILLE & ATLANTIC.—See Louisville & Nashville.

LOUISVILLE & NASHVILLE.—The entire $1,000,000 stock and bonds and $550,000 short-term notes of the Louisville & Atlantic have been acquired by the Louisville & Nashville. The road of the Louisville & Atlantic runs from Versailles, Ky., to Beattyville Junction, 101 miles.

PACIFIC & EASTERN OF OREGON.—John R. Allen, president, is offering $400,000 first mortgage 6 per cent. bonds of 1907-1937 at 90. Ten per cent. bonus of stock is given with the bonds. The company's authorized issue of first mortgage bonds is $1,000,000, of which previous to the present offering $240,000 were outstanding. There is $1,000,000 authorized stock, of which $500,000 is outstanding. The company is operating 12 miles of road from Medford, Ore., to Eagle Point. See this company under Railroad Construction.

ST. LOUIS & SAN FRANCISCO.—Speyer & Co., New York, announce that about $10,000,000 general lien 5 per cent. bonds of the St. Louis & San Francisco are to be placed in France. These bonds, of which the present issue will be a special French series in denomination of 516 francs, are part of a total authorized issue of $109,000,000, of which $35,000,000 are listed on the New York Stock Exchange.

SEABOARD AIR LINE.—The committee, C. Sidney Shepard, chairman, and D. C. Porteous, secretary, 24 State street, New York, representing every class of security holders, have issued a circular giving the plan of reorganization which they urge security holders to assent to. The committee says in part:

"The receivers have paid the interest maturing on all underlying divisional bonds of the Seaboard system, on the Seaboard Air Line 10-year and 3-year collateral trust bonds, and on the bonds of the subsidiary lines endorsed or guaranteed by the railway to the extent that those lines themselves failed to make such payment. Consequently the only bonds interest on which is in default are $12,775,000 S. A. L. first mortgage 4 per cent. bonds and $6,345,000 S. A. L. general mortgage 5 per cent. bonds. Interest on $700,000 6 per cent. collateral gold notes, secured by the deposit of general mortgage 5 per cent. bonds, is also in default. The receivers under order of the court have paid the interest on a large portion of the floating debt.

"Under the plan it is intended that:

"(1) The following securities shall be paid in full with interest:

$7,510,000 receivers' certificates, and
700,000 6 per cent. notes;

"(2) The following securities shall remain undisturbed:

$30,400,000 underlying divisional bonds,
10,000,000 ten year 5 per cent. collateral trust bonds,
4,651,000 three-year 5 per cent. collateral trust bonds.
12,775,000 first mortgage 4 per cent. bonds,
23,894,100 preferred stock, and
37,019,400 common stock;

"(3) The Seaboard Air Line Railway shall continue liable for all its debts and obligations, including its guarantees of the bonds of the Florida West Shore; Macon, Dublin & Savannah, and the Savannah & Statesboro.

"(4) The $6,345,000 general mortgage 5 per cent. bonds shall be exchanged dollar for dollar for adjustment mortgage 5 per cent. bonds, part of a total issue to be authorized of $25,000,000. These shall be cumulative income bonds. For interest on the general mortgage 5 per cent. bonds matured and to mature up to and including August 1, 1909, adjustment bonds shall be issued, dollar for dollar.

"(5) The first mortgage 4 per cent. bondholders shall receive all matured and unpaid interest in cash and shall agree that their bonds may be redeemed or purchased by the Seaboard Air Line or its successor at par and accrued interest on any interest payment date.

"(6) The necessary new money for the payment of receivers' certificates and other liabilities the immediate discharge of which the plan contemplates, shall be obtained from the sale of $18,000,000 of adjustment bonds, at 70 per cent., the sale of which has been underwritten at a commission of 5 per cent.

"Stockholders of record, at a date to be hereafter fixed, shall be entitled to purchase at 70 per cent. of their par value adjustment bonds to the amount of 30 per cent. of their holdings.

"(7) The future development of the property and the refunding of existing bonds shall be provided for by a refunding mortgage securing an authorized issue of $125,000,000 of 4 per cent. bonds.

"(8) It is intended to vest in the Seaboard Air Line by sale, merger, consolidation or otherwise the properties of the following companies: Atlanta & Birmingham Air Line;

Atlantic, Suwanee River & Gulf; Catawba Valley Railway; Florida West Shore; Plant City, Arcadia & Gulf; Roanoke & Tar River; Seaboard & Roanoke; Tallahassee, Perry & Southeastern, and of all other railway companies, substantially the entire capital stock of which is owned by the Seaboard Air Line Railway; except the properties of such companies as after careful investigation it appears more advantageous to operate under their separate organizations.

It is estimated that the earnings for the fiscal year ended June 30, 1909, remaining after payment of rental, taxes, etc., and applicable to the payment of interest, will amount to $4,750,775. Under the present capitalization of the company the annual interest charges amount to $4,265,550, but under the plan proposed by the committee the interest charges will amount, before any of the refunding bonds are issued (see plan above), to $3,288,710. The following table shows the proposed disposition of the cash to be received from the sale of the $18,000,000 adjustment mortgage bonds:

Proceeds from sale of $18,000,000 adjustment bonds after deducting underwriting commission		$11,700,000
Receivers' certificates	$7,510,000	
Two-year notes and interest	763,000	
Three coupons on first mortgage 4s	766,000	
Leaving applicable toward floating debt, interest, expenses of receivership, expenses and compensation of the committee, etc.	2,661,000	
		11,700,000

"The floating debt, including certain notes for real estate (but not including ordinary current indebtedness) amounts to about $2,500,000.

"It is estimated that the cash in the hands of the receivers on July 2, 1909, will be about $2,165,600."

The S. A. L. has acquired a controlling interest in the Chesterfield & Lancaster, which company has outstanding $500,000 stock. Its road runs from Cheraw, S. C., to Pageland, 38 miles.

Southern Pacific.—See Union Pacific.

Toledo & Ohio Central.—Complying with the order of the Circuit Court at Columbus, Ohio, for the separation of the control and operation of the Hocking Valley and the Kanawha & Michigan from the control and management of the Toledo & Ohio Central and the Zanesville & Western, new officers have been elected and appointed for these roads. The Hocking Valley and the Kanawha & Michigan in future will have the same officers and the Toledo & Ohio Central and Zanesville & Western in future will have the same officers. See Railroad Officers.

Union Pacific.—Kuhn, Loeb & Co., New York, have bought the $37,500,000 Southern Pacific 4 per cent. convertible bonds of 1909-1929 which were allotted to the Union Pacific as its pro rata share of the total authorized issue of $82,000,000 bonds recently offered to stockholders of the Southern Pacific at 96, on the basis of 30 per cent. of their holdings of stock. The $44,500,000 of these bonds that were allotted to stockholders other than the Union Pacific were underwritten by Kuhn, Loeb & Co. The bonds have sold recently as high as $104⅞.

Wabash.—The $485,000 Buffalo Terminal Association guaranteed notes, which were extended for one year in 1907, and again at 6½ per cent. in 1908 to June 29, 1909, are being paid at presentation by the City Trust Co., of Boston, Mass.

Washington (D. C.) Terminal Co.—Harvey Fisk & Sons and Brown Brothers & Co., New York, are offering at 102½ the unsold portion of $2,000,000 first mortgage 4 per cent. bonds due 1945. The bonds are guaranteed, principal and interest, jointly by the Baltimore & Ohio and the Philadelphia, Baltimore & Washington.

Wisconsin Central.—The directors have authorized an issue of $2,500,000 new 50-year first and refunding bonds, the proceeds of the sale to be used in paying for construction of a terminus at Duluth, Minn.

Yellowstone Park Railroad.—The Circuit Court of the United States, Ninth circuit, district of Montana, on June 30 appointed M. W. Maguire and H. R. French receivers of this road, pending action on the application for the appointment of a permanent receiver. Mr. Maguire was formerly connected with the Norfolk & Western.

Zanesville & Western.—See Toledo & Ohio Central.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

The Alabama Great Southern has ordered 20 locomotives from the Baldwin Locomotive Works.

The Missouri Pacific has ordered 30 consolidation locomotives from the American Locomotive Company.

The Denver, Northwestern & Pacific has ordered two 2-6-6-0 Mallet locomotives from the American Locomotive Co.

The Baltimore & Ohio is said to be in the market for 60 locomotives and that later the number may be increased to 100.

The Chilean State Railways, Servicio de Materiales, Santiago, are asking bids, up to July 31, on five locomotive tenders.

The Washington-Oregon Traction Co., Walla Walla, Wash., is said to be in the market for one oil-burning locomotive for construction purposes. This item is not confirmed.

The Northwestern of Brazil has ordered three ten-wheel locomotives from the American Locomotive Company and twelve ten-wheel locomotives from the Baldwin Locomotive Works.

The Atchison, Topeka & Santa Fe, reported in the *Railroad Age Gazette* of July 2 as having ordered 4 Mallet compounds and 18 Pacific locomotives, is thought to have given this order to the Baldwin Locomotive Works.

The Canadian Pacific, which was reported in the *Railroad Age Gazette* of June 25 in an unconfirmed item, has ordered 15 ten-wheel mixed traffic locomotives from the Montreal Locomotive Works, Ltd.

General Dimensions.

Weight on drivers	143,000 lbs.
Weight, total	194,700 "
Cylinders	22½ in. x 28 in.
Diameter of drivers	63 "
Boiler, type	Extended wagon top
" working steam pressure	180 lbs.
" diameters	69 in.
Firebox, width	70½ "
Firebox, length	103 "
Tubes, number and diameter	290, 2-in. and 24 5-in.
Tubes, length	14 ft. 4 in.
Water capacity	5,000 Imp. gals.

CAR BUILDING.

The Chicago, Burlington & Quincy is in the market for 500 refrigerator cars and 2,000 box cars.

The Canadian Pacific has added 22 observation cars to its equipment for use on its trans-continental line.

The Baltimore & Ohio is in the market for 45 sixty-ft. vestibuled coaches and 5 sixty-ft. combination baggage and passenger cars.

The Cincinnati, New Orleans & Texas Pacific is reported to be asking prices on about 700 steel gondolas. This item is not confirmed.

The Alabama Great Southern has ordered 500 gondola cars from the Standard Steel Car Company and 250 gondola cars from the Pressed Steel Car Company.

The Washington-Oregon Traction Co., Walla Walla, Wash., is said to be in the market for 100 box cars, 10 flat cars and one work car. This item is not confirmed.

The Grand Trunk, since January 25, has ordered six first-class passenger cars and four parlor-buffet cars from its Montreal shops, and has received five baggage cars and 25 cinder cars.

The Houston, Fostoria & Northern, reported in the *Railroad Age Gazette* of June 25 as being in the market for 80 flat cars,

has ordered this equipment from the American Car & Foundry Company.

The Atchison, Topeka & Santa Fe, reported in the *Railroad Age Gazette* of July 2 as being in the market for passenger coaches, has ordered six coaches from the Pullman Company for August delivery.

The Gallatin Valley Electric Ry., Bozeman, Mont., has ordered, through Westinghouse, Church, Kerr & Co., one double-truck, semi-convertible, passenger, baggage and smoking car from the American Car Company.

The Harriman Lines, reported in the *Railroad Age Gazette* of June 11 as being in the market for about 5,000 freight cars, has ordered 3,325 box cars from the American Car & Foundry Co., about 420 cars, including furniture, stock and caboose, from the Standard Steel Car Co., and about 1,200 cars, including flat cars, gondolas and hopper cars, from the Pressed Steel Car Co.

The Long Island, as reported in the *Railroad Age Gazette* of July 2, has ordered 100 steel motor passenger cars from the American Car & Foundry Company, delivery of which is to begin January 1. These cars will have a capacity for 70 passengers and will weigh 102,000 lbs. They will be 53 ft. 8⅝ in. long, 9 ft. 1⅛ in. wide and 8 ft. 5⅛ in. high, inside measurements, and 64 ft. 5¾ in. long and 9 ft. 11 in. wide, over all, and 13 ft. high above the rails. The bodies and underframes will be of steel. The special equipment will include:

Axles	Trailer open-hearth, motor carbon steel
Bolsters, truck	Pressed steel
Brakes	Westinghouse
Brake-shoes	Long Island standard
Brasses	Ajax Metal Co.
Couplers	Kiesel type
Curtain fixtures	National Lock Washer Co.
Curtain material	Pantasote
Doors	Steel
Draft gear	Westinghouse friction
Dust guards	Wood
Heating system	Electric heaters
Journal boxes	Symington
Lighting system	Electric
Platforms	Steel
Roofs	Steel, welded
Seat covering	Rattan
Side bearings	Plain
Springs	Union Spring & Mfg. Co.
Trucks	Steel, Pennsylvania standard
Ventilators	Deck sash type
Vestibules	Steel
Vestibule trap doors	Steel, with O. M. Edwards fixtures
Wheels	Rolled or forged steel
Window fixtures	O. M. Edwards Co.

IRON AND STEEL.

The Lake Shore & Michigan Southern has ordered 1,000 kegs of spikes.

The Eastern Railway Supply Co., Baltimore, Md., is asking prices on 100 tons of steel.

The Chicago, Burlington & Quincy has ordered 800 tons of rails from the Carnegie Steel Co.

The Duluth, South Shore & Atlantic has ordered 1,300 tons of rails from the Carnegie Steel Co.

The Atchison, Topeka & Santa Fe has ordered 10,000 tons of tie plates from the Illinois Steel Co.

The Northern Pacific has ordered 12,000 tons of rails from the Carnegie Steel Co., and is reported in the market for about 1,000 tons of tie plates.

The San Pedro, Los Angeles & Salt Lake has ordered 500 tons of structural steel from the Llewellyn Iron Works, Los Angeles, Cal., for its shops at Las Vegas, Nev.

The Chicago & North Western is reported to have divided an order for about 700 tons of bridge material between the Worden-Allen Structural Co., Minneapolis, Minn., and the Modern Structural Steel Co., Waukesha, Wis.

The Chicago, Milwaukee & St. Paul, in addition to the items mentioned in the *Railroad Age Gazette* of July 2, has ordered 700 tons of structural steel for four 4-span truss bridges on its Iowa lines and also 350 tons for smaller structures.

General Conditions in Steel.—All indications predict a continued upward movement in steel prices. An officer of one steel company is reported to have said that before the end of the year prices will advance on an average of $2 per ton above the present level. Steel manufacturers seem confident of these advanced prices and are showing no inclination to book large orders for future delivery at current prices. Reports from Birmingham, Ala., say that rails were the last commodity in the Southern metal market to show recovery and enter the buying movement, but that they are now active. Recent rail orders are said to be sufficient to operate the rail mill of the Tennessee Coal & Iron Company at full capacity.

RAILROAD STRUCTURES.

CISCO, TEX.—It is said that the Texas Central has let the contract for its passenger station at this place.

CROCKETT, TEX.—It is reported that the International & Great Northern will build a brick station and freight warehouse to cost about $10,000.

CYPRESS, TEX.—The Houston & Texas Central will build a station on a new town site between Cypress and Hockley.

DALLAS, TEX.—It is reported that the Northern Texas Traction Co. expects to build a one-story brick station to cost about $15,000.

GALVESTON, TEX.—Contractors' bids on the new causeway were opened on June 28. The proposed structure, which was fully described in the *Railroad Age Gazette* of June 11, is expected to cost about $1,400,000. Contracts let to the A. M. Blodgett Construction Co., of Kansas City, Mo., for the bridge and the roadway, and for the open draw to the Pennsylvania Bridge Co., for a Scherzer rolling lift bridge.

LETHBRIDGE, ALB.—The last of the steel piers for the Canadian Pacific bridge has been completed. The structure is to be 312 ft. high and 5,327 ft. long. It will rest on 67 steel piers, with natural rock foundation; will require 12,000 tons of steel and will cost $1,500,000. (Sept. 25, 1908, p. 1022.)

NORTHUMBERLAND, PA.—See Pennsylvania under Railroad Construction.

OAKLAND, CAL.—The Board of Public Works has granted permission to the Western Pacific to put up a two-story terminal station in West Oakland at a cost of about $30,000.

The Oakland Dock & Terminal Co. has been incorporated with a capital stock of $5,000,000 to build docks and warehouses.

OMAHA, NEB.—The Omaha and Council Bluffs Street Railway Co. of Omaha, Neb., has let the contract for a two-story car barn at Tenth and Pierce streets. The building is to be of reinforced concrete and will cost about $150,000.

PURCELL, OKLA.—Reports say the Atchison, Topeka & Santa Fe expects to build a $60,000 depot.

SAN ANGELO, TEX.—According to press reports bids have been asked for by the Gulf, Colorado & Santa Fe to put up new roundhouses at San Angelo and at Somerville.

SOMERVILLE, TEX.—See San Angelo.

TACOMA, WASH.—The new $50,000 freight sheds of the Great Northern have been finished and turned over to the company.

TEMPLE, TEX.—A contract is said to have been let by the Gulf, Colorado & Santa Fe for a new passenger station to cost about $75,000. Work is to be started within 30 days. (Jan. 22, p. 189.)

WINDSOR, ONT.—It is reported that the Michigan Central intends to build a 20-stall roundhouse and passenger station.

SIGNALING.

The Oregon Railroad & Navigation Co. is preparing to adopt the A B C system of block signaling on its lines between Spokane, Wash., and Tekoa, 49 miles. The A B C system is that used extensively on the Northern Pacific, and described in the *Railroad Age Gazette* of February 19 and 26 last.

Supply Trade News.

The Atlas Locomotive Ash Pan Co., recently incorporated at Fort Wayne, Ind., will build a factory at Muncie.

The Hungarian Legislature has arranged to establish five large machine tool works, and plans have been made for erecting 20 other works and foundries.

The Pressed Steel Car Co., Pittsburgh, Pa., has leased and in the future will operate the plant of the Pennsylvania Malleable Co., Pittsburgh, with works at McKees Rocks, Pa.

The office of Joseph H. Ames, chief engineer of the American Car & Foundry Co., New York, has been moved from St. Louis, Mo., to the Railway Exchange building, Chicago.

The Railroad Tie Supply Co. of Texas, Trinidad, Tex., has been incorporated with a capital stock of $100,000. The incorporators are: E. M. Telle, W. H. Mosely, and E. P. Miller.

The Baker-Pilliod valve gear, made by The Pilliod Company, Chicago, has been specified for use on the 12 consolidation engines now being built by the American Locomotive Co. for the Ann Arbor.

By mutual agreement, the firm of Burnham, Williams & Co. was dissolved on July 1, and its entire property and interests in the locomotive business were sold to the Baldwin Locomotive Works, Philadelphia, Pa.

The Stover Motor Car Corporation, Philadelphia, Pa., has been organized, with offices at 1201 Harrison building, Philadelphia, to take over the Stover Motor Car Co., Freeport, Ill. The new company has $200,000 capital stock. The factories will be at Wilmington, Del., and Freeport, Ill.

Cuba has established a bureau of information, the director of which is Leon J. Canova, an American newspaper man, who has resided in Cuba eleven years. Information of any nature concerning Cuba can be obtained by writing to Mr. Canova, at the Department of Agriculture, Commerce and Labor, Havana.

A. Munch, formerly sales manager of the Northern Metallic Packing Co., St. Paul, Minn., has become manager of the railway department of the North Western Metal Manufacturing Co., Mineapolis, Minn. The latter company has been appointed exclusive sales agent for the Plunger plastic throttle packing.

The American Nut & Bolt Fastener Co., Pittsburgh, Pa., reports that orders for the past six months have averaged 700,000 Bartley positive fasteners per month. The president of the company expects business to increase by the first of January, 1910, so as to exceed 1,500,000 fasteners per month.

On the Southern Railway coaches, contracts for which were recently let to the Barney & Smith Car Co. and the Pullman Company, the O. M. Edwards Co., Syracuse, N. Y., steel trap door and window fixtures will be used. The window fixtures are the latest design of No. 13 lock, and the trap doors are to be the all steel improved automatic.

A. Bradshaw Holmes, secretary and treasurer of the Independent Pneumatic Tool Co., and the Aurora Automatic Machinery Co., Chicago, died on June 30, from injuries sustained by accidentally falling from the piazza of his hotel. He was 31 years old and unmarried. Mr. Holmes was well known in the pneumatic tool business, having been connected with the Standard Pneumatic Tool Co., and the Rand Drill Co. for a number of years prior to his connection with the Independent Pneumatic Tool Co., of which he was secretary and treasurer since its organization.

The Brown & Sharpe Manufacturing Co., Providence, R. I., exhibited at Atlantic City a No. 5-B heavy plain and a No. 3 vertical spindle milling machine, both motor driven, together with a line of milling machine attachments. On the No. 5-B machine it removed 18 cu. in. per minute in steel of 65,000 lbs. tensile strength at a feed of 16 in. per minute and surface speed of 60 ft. per minute. The size of the cut taken was 6 in. wide and $\frac{5}{16}$ in. deep. At no time during the running under such severe strains did the machine show signs of distress or appear to labor excessively and there was a noticeable absence of vibration from all parts. A nickel was placed on edge at one end of the table and a full glass of water at the other end. Cuts were taken under these sensitive tests and the nickel did not fall nor did the water spill over. A gang of two cutters was used, 3¾ in. in diameter. On the No. 3 vertical spindle machine 9.375 cu. in. per minute were removed at a table feed of 12½ in. per minute and a surface speed of 60 ft. per minute. A cut 6 in. wide and ⅛ in. deep was taken at each traverse of the table. The cutter used was a 9½ in. inserted tooth face mill. The same tests were applied to this machine as were to the No. 5 machine. Both these machines were equipped with motor drive, General Electric Co., Schenectady, N. Y., direct circuit motors being employed. The motor drive of the No. 5 machine was 20 h.p. capacity, while the one driving the No. 3 was 10 h.p. capacity. The voltages under which the motors were operated were 220 and 210, respectively. The amount of stock removed per net horse-power consumed was 0.85 cu. in. on the No. 5 and 0.88 cu. in. on the No. 3. One gang of cutters used on the No. 5-B heavy plain milling machine cut 1,800 cu. in. of steel without having to be removed from the arbor for sharpening.

TRADE PUBLICATIONS.

New York Central.—A tourist's booklet has been published giving rates from Chicago to prominent eastern points. A large map is included.

A Few Facts.—This subject indicates the nature of a 24-page book by the Pilliod Company, Chicago, on the Baker-Pilliod valve gear. Eight full-page cuts are included showing the application of the valve gear to various types of engines. A large blue print of the device and actual engine service tests are also included.

Chimneys and Globes.—The Storrs Mica Co., Oswego, N. Y., has just issued a small catalogue describing Storrs "never-break" mica chimneys and globes for railway use. This catalogue contains a number of half-tone illustrations, showing various sizes and designs of these chimneys for headlight, coach, caboose, station, switch and signal lamp and lantern use.

Axle Light System.—The Consolidated Electric Lighting & Equipment Co. has just issued Bulletin No. 8, which contains general instructions for maintenance and operation of type D and type F equipments with Kennedy regulator. The catalogue is completely illustrated with both half-tone and line-cut illustrations, showing both the method of attaching these equipments to cars and their various parts.

Lever Jacks.—Another of the series of publications being issued by the Joyce Cridland Co., Dayton, Ohio, has just been received. This catalogue contains a general description of various jacks of the lever type, and also in some detail the mechanisms by which many of the automatic features are accomplished. The workings of the full automatic jack are fully described and illustrations show the various operations. This company builds jacks for every class of work, each one designed especially to meet the conditions for which it is intended.

Car Window Fixtures.—Catalogue 17 of the Grip Nut Co., Chicago, is devoted to Universal car window fixtures and accessories, which have been put on the market by this company within the past year. The different fixtures and their application are unusually well shown, all of the illustrations, with one or two exceptions, being in colors, and most of them in three colors. The company makes more than 300 different combination designs, in any metal or finish. Universal window fixtures were described in the *Railroad Age Gazette* of February 12, 1909.

Transformers, Railway Generators, Etc.—The General Electric Co., Schenectady, N. Y., has just issued Bulletin No. 4666, describing an improved form of type H transformer. The advantages claimed for this new design are better efficiency; greater uniformity of impedances; improved connection board, together with an improved metnod of supporting the primary and secondary leads; a new type of suspension hook, and a new device for clamping the transformers in the cases. Bulletin No. 4664 describes a new line of d.c., constant speed, engine-driven railway generators, form S. The standard line of these generators range in capacity from 100 k.w. to 2,700 k.w. Bulletin No. 4670 describes gaskets and bell mouths for conduit

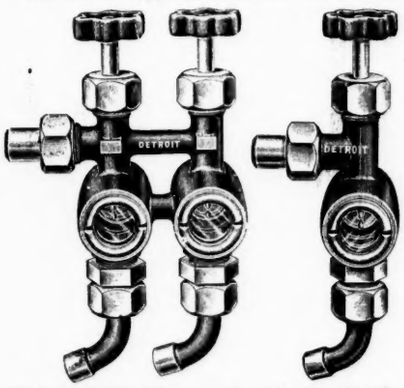
wiring, marine railway car equipments and underground circuits. Bulletin No. 4668 covers the G. E. 216-A railway motor of box frame type, equipped with commutating poles and mica insulated brush holders, with removable armature shaft.

Electric Motor Control.—The Electric Controller & Manufacturing Co., Cleveland, Ohio, has just issued a very neat pamphlet which contains a series of five articles written by A. C. Eastwood, president of the company. An idea is gotten of the contents of this booklet from the following titles: "The Importance of the Controller," "Theory and Application of Rheostatic Controller," "Series Parallel Control," "Magnetic Switch Controllers," etc. This company has also issued a folder containing a large number of illustrations showing the use of its lifting magnets. These magnets were illustrated and described in the *Railroad Age Gazette* of December 4, 1908, and April 23, 1909.

Detroit Sight Feed Air Cylinder Lubricator.

This lubricator is designed to overcome the difficulty in securing proper lubrication of locomotive air cylinders and air-brake pumps. The device gives the engineer complete and convenient control of the lubrication of the air cylinder of the air-pump, as well as insuring the use of proper oil. It consists of three parts, the emergency valve, the sight-feed fitting and the check-valve connection. It is made in two styles, single-feed and double-feed. The single-feed style is intended for use on locomotives equipped with either a 9½-in. or a 11-in. Westinghouse air-pump. The double-feed style is intended for use on locomotives equipped with two Westinghouse pumps, with a New York duplex pump, or with a Westinghouse compound pump.

The oil is supplied from the oil chamber of any bull's-eye Detroit locomotive lubricator through the emergency valve. The emergency valve should never be used as an oil regulating valve, but is intended either to throttle the pressure from the lubricator to the air-brake attachment or to cut off the attachment if for any reason it is desired to do so. When the Detroit air cylinder lubricator is to be used with other makes of hydrostatic lubricators, special emergency valves should be used.



Detroit Double and Single-Feed Lubricators.

The sight-feed fitting, equipped with bull's-eye glasses, may be located either to the right or left of the regular locomotive lubricator, or at any convenient point on the boiler head. In order to prevent compressed air from entering the oil delivery pipe between the sight-feed fitting and the air cylinder of the air-pump, a check valve connection is provided, containing a ball check, seating upward. The check valve conection may be screwed into the tap provided for the oil cups. No trap should exist in the oil delivery pipe between the sight-feed fitting and the oil inlet to the air cylinder, but a gradual decline should be maintained between these points, as the oil flows through this space from gravity and the pump suction. There must also be a trap formed between the regular lubricator and the sight-feed fitting of the air cylinder lubricator to prevent water from entering the oil supply pipe after the oil has been fed from the reservoir of the regular lubricator. Therefore, if it is desirable to locate the sight-feed fittings at a lower point on the boiler head than the regular locomotive lubricator, the oil supply pipe should first extend upward to about the same height as the upper part of the oil reservoir of the regular lubricator and then downward to the desired point. With this arrangement water cannot enter the oil supply pipe.

The best practice recommends that no more than 10 drops of oil be fed at any one time, and at intervals, according to the judgment of the engineer. These lubricators are made by the Detroit Lubricator Company, Detroit, Mich.

International Correspondence Schools.

The Railway Department of the International Correspondence Schools is operating at 5037 Cottage Grove avenue, Chicago, a modern and thoroughly equipped air-brake, locomotive and railway instruction plant. It is operated for the specific purpose of teaching railway employees economical and safe methods of train and locomotive handling.

Practical demonstrations of the operation of the brake and the handling of trains are given and special attention is devoted to new devices as they are adopted by railways. There are all facilities for instructing students on valve motion and the best methods of making road repairs and getting into terminals with the least possible delay. The instructors have had many years of practical experience. Special attention is devoted to firemen preparing for the examinations for engineers.

In addition to a regular air-brake room, in which apparatus is seen in actual operation, separate study rooms are provided for students to write the progressive examination questions submitted by railways which have adopted this system of examination.

Students are in attendance not only from all parts of the United States, but from Canada, Mexico and other countries. Out-of-town students may obtain board and lodging in the immediate vicinity at most reasonable rates. The large attendance since the plant has been in operation proves that there is a want for a schoolroom of this kind. That the railway department of the schools is conducting its work on the right lines is shown by the creditable examinations its students have undergone.

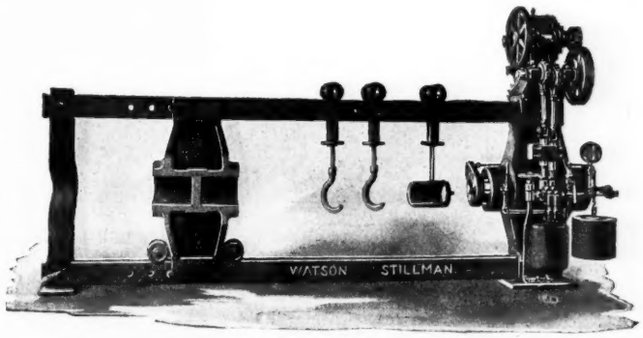
The plant is equipped with 47 freight car brakes in actual operation; six passenger car brakes with high speed attachment; air-signaling equipment for a ten-car train; operative and sectional models working in tandem; the latest Westinghouse E. T. air-brake apparatus; sectionals of all makes of lubricators and injectors; models of standard link motion; models of Walchaerts valve motion; stereopticon views of every part of different kinds of locomotives; specially prepared views to teach valve motion; special views showing breakdowns and repair methods; study rooms for students, and lecture rooms for classes.

W. N. Mitchell is General Manager of the Railway Department.

Watson-Stillman Hydro-Pneumatic Wheel Press.

The accompanying cut shows a hydro-pneumatic wheel press made by the Watson-Stillman Co., New York, for which a number of advantages are claimed. The ram can be moved up to its work in a little time and the construction is light in weight, and, it is said, will do heavy work with absolute accuracy. The hydro-pneumatic operating system gives the quick movement of pneumatic tools, and this, combined with the certainty and power of a hydraulic press, greatly increases the capacity of the machine, while, at the same time, air pressure from the shop system is made available to facilitate the work.

Referring to the illustration, air is connected through a separate three-way valve to the closed cylindrical reservoir at the right. When the ram is at the back end of its stroke as shown, this reservoir is almost filled with water. The admission of air to the reservoir forces the water under pressure through the pumps and into the



Watson-Stillman Hydro-Pneumatic Wheel Press.

main cylinder, thus pushing the ram out at several times the speed that can be obtained where the water must be drawn into the pump by suction. When the ram stops under air pressure, both pump pistons immediately act to force the ram further, resulting in a more steady movement than with the regular two or three-speed hydraulic construction.

While the feature of hydro-pneumatic operation has been the basis of the popularity of this machine, special attention is called to the four-rod construction. When the lines of pressure and resistance lie within single rods at top and bottom there is said to be a tendency on heavy work for the press to spring sidewise, as it is practically impossible to keep the strains within such narrow limits. In the Watson-Stillman hydro-pneumatic press, two heavy rods at both top and bottom are used, the rods being from three to six inches apart. The ram and moving abutment are centered between these, so that there is no tendency to spring out of line. The work will be well squared up in this four-rod construction, and there is the added advantage that no heavy base plate is required. All parts under stress are of a good quality steel, while the smaller and working parts may be depended upon to withstand hard usage without showing under wear. The cylinders are protected by copper lining.

The moving abutment is supported by four wheels, with base wide enough that it may be moved with ease and safety. The suspension

hooks and compression cap are supported by two-wheeled trolleys. The machine is furnished with motor drive, as shown, or with suitable pulleys for belt drive. In the latter, the pulleys should run at about 125 r.p.m. These presses range in capacity from 60 to 600 tons.

The Lighting of Erecting Shops and Heavy Machine Shops.

BY S. H. KNAPP.

The artificial lighting of the work in erecting shops and heavy machine shops, so that the employees can have working conditions equal to daylight has, in the past, been a difficult problem. The great height of the heavy cranes has made it necessary to place most, if not all, of the lighting units underneath the cranes. In many instances it has been impossible to install lamps anywhere except on the side walls, although it is readily apparent that with an arc or incandescent cluster in that position, much of the light is absorbed by the dark walls, and consequently in the center of the room the lighting is most unsatisfactory. Again, with low lighting from the side walls, locomotives or high machines may hide the source of light, producing large shadows in the center of the floor. Were it possible to obtain from skylights all the daylight required for satisfactory lighting, this arrangement would unquestionably give the best distribution and diffusion. Accordingly, if these satisfactory conditions can be artificially duplicated by placing the light source directly over the machines and workmen a better distribution and the avoidance of eclipsing shadows will be obtained.

The Cooper-Hewitt lamp, with its perfect diffusion resulting from a large luminous surface, makes possible the satisfactory illumination of a great volume of serviceable light at a minimum expenditure of electrical energy; that the source of light may be installed at a great height and still give satisfactory floor illumination; that shadows can be almost wholly eliminated, and a perfect diffusion of pleasing light, the equal of daylight for manufacturing purposes can be obtained. The very long life of the tubes—numerous installations having averaged over seven thousand hours burning—assures a very economical maintenance, and the user is not subject to the annoyance and delay often caused where it is necessary to retrim arc lamps during working hours. The fact that many of the large railway systems throughout the country, after testing different forms of illumination, have installed and extended their systems of Cooper-Hewitt lighting, would indicate that they consider it the best and most efficient system at the present time.

Erecting Shop Lighted by Cooper-Hewitt Lamps.

floor surface from a much greater height than was formerly considered possible. At the same time, the comparative length of light source in the 50-in. tubes makes it possible for heavy cranes to pass underneath without causing sharply defined shadows. This, with the absence of glare, as obtained from other illuminants, makes it possible for the mechanic to distingaish detail in his work with accuracy.

The accompanying photograph shows an erecting shop of one of the large railway systems lighted by 34, type F, Cooper-Hewitt lamps, giving 28,900 c. p., at a current consumption of 13.6 kilowatts. The dimensions of this building are 442 ft. x 94 ft., giving 41,550 sq. ft. of area. The height of the lamps from the floor is 50 ft., and 1,225 sq. ft. of floor surface is allowed per lamp. In an adjoining erecting shop, of three-fourths the size, two and one-half times as much power is being used to furnish arc lighting from the side walls, with most unsatisfactory results.

In heavy machine work, some idea of Cooper-Hewitt illumination can be obtained from the fact that a room of the Rensselaer Manufacturing Company, Troy, N. Y., where hydraulic valves to the weight of 26 tons are manufactured, contains 10,180 sq. ft. of floor surface and is lighted by 10 type K, Cooper-Hewitt lamps, giving 7,000 c. p. This installation has been in use since October, 1907, and the total cost for maintenance to June 1, 1909, has been $24. It is interesting to compare this maintenance item for almost two years—in which the labor element is almost wholly eliminated—with that of any of the other systems of lighting, and to contrast it with the attention demanded by arc-lighting systems, particularly of the flaming type, which if used many hours per day total a maintenance cost almost prohibitive.

Summing up, these results show that in the use of the lamps of the Cooper-Hewitt Company, New York, the manufacturer can obtain a

Western Electric Company.

The business of the Western Electric Co., Chicago, is running at the rate of approximately $46,000,000, which compares with $33,000,000 for the fiscal year of 1908 and $53,000,000 for the fiscal year 1907. The present business outlook seems good but without anything to lead the company to expect an unusual growth.

Some lines, such as sales to the telephone companies outside of the Bell system (which have been a feature of the business for only the last year and a half) have shown a very satisfactory growth. Business in machinery has, notwithstanding the depression, grown steadily throughout the last few years and is now at the highest point in the history of the company. Business is running more than ever before to moderate-sized motors and generators, largely used for industrial plants, which shows a healthy activity, and the prices and margins of profit at which they are being sold were never so good. The increase in the machinery sales for the half-year ended May 31 was 40 per cent. over the same period a year ago. A large part of the machinery orders were for additions and improvements.

Gross business for the first quarter of the fiscal year ran at the rate of $42,000,000 per year and for the last quarter at the rate of nearly $50,000,000, an increase of about 19 per cent. While the business for May is usually ahead of the business of the preceding month, the increase of May, 1909, over May, 1908, showed approximately 60 per cent. The month of April, 1909, showed an improvement equivalent to 50 per cent. over April, 1908, and if the ratio of improvement of the last two months continues the company will easily attain a $50,000,000 year.

The volume of the company's orders for the six months increased about 30 per cent. over the same period in 1908 and the average value per order increased approximately 10 per cent. In certain lines the volume of orders increased more than 50 per cent.

The export business for the most part has not felt the impetus of the improvement in this country, running only slightly ahead of last year. The European business from the company's foreign plants, however, gained 30 per cent. over a year ago and was 12 per cent. greater than 1907, which previously held the high record. The company's trade with foreign countries is not so much dependent upon industrial conditions as the condition of the foreign governments' exchequers. A greater part of the export business is done with South American countries, which felt the effects of the panic heavily. Canada reports improvement in trade.